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ABSTRACT

Included is a description of the present status and needed improvements in biology teaching in Mauritius. Needed changes are described in terms of curriculum, examinations, preservice and inservice training of teachers, production of resource materials and simple apparatus, the use of educational television, radio broadcasts and audio-visual aids, and the need for overall coordination. Detailed proposals were made for improving the status of environmental education in Mauritius, and for the establishment of education services at the Natural History Museum. Biology teachers were involved in several workshops and seminars and helped to prepare a new biology course. Appendices include reports and proposals submitted at various stages in the project, construction guides for some inexpensive apparatus, and 95 photographs. (EB)

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Report to: Division of Science Teaching,
United Nations Educational Scientific
and Cultural Organisation

on: Two and One Half Months as Consultant
to the Government of Mauritius, Ministry
of Education and Cultural Affairs on
Aspects of Biology Teaching - September
to December, 1969

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SECTION 1. Summary and Main Conclusions

1.1 Biology study groups in Mauritius have, since 1965, been working on aspects of biology teaching in association with the Unesco Pilot Project for Biology Teaching in Africa.

1.2 In Mauritius, in October 1969, biology was improving in status largely as a result of the work of the study groups but it was still relatively unpopular compared with physics and chemistry.

1.3 The current curriculum in biology is the course for the Cambridge University School Certificate and Higher School Certificate. Examinations are largely traditional and teaching in October 1969 was in the main, not in tune with modern trends towards enquiry learning or development of understanding of man's environment.

1.4 There is a satisfactory system of pre-service training for primary school teachers but no training is available for secondary school teachers. Biology teachers must obtain degrees and teaching qualifications overseas.

1.5 In the absence of a Central Institute of Education or Science Teaching Centre there is no institutional leadership for planning a comprehensive programme of science teaching improvement, including curriculum research and development, production of teaching resources, organisation of a biological supply centre, provision of evaluation and testing services, or for the organisation of in-service training of teachers. The establishment of such a central agency is recommended.

1.6 Programmes of school lessons on television began systematically in September 1969 and school radio broadcasts have been in operation for some years. Both types of broadcasts need considerable development, and at present there are no special educational programmes for teachers or for adults in rural areas. It is recommended that the Visual Aids Unit of the Ministry of Education continue to develop radio broadcasts for schools and that a separate unit be established for E.T.V.

1.7 In order to co-ordinate and further develop activities leading to the development of biology in schools the two original biology study groups were amalgamated and formally constituted as an executive group. In addition, a consultancy panel of professional biologists was formally set up and commissioned to assist biology teachers in their various activities. A national co-ordinator was appointed to organise future activities.

1.8 A survey was made of various resources in Mauritius available to help in biology teaching. Field sites were located and institutions visited. Teachers were trained in the special techniques of field teaching. The natural history museum was surveyed in some detail from the point of view of teaching, and recommendations made to the Ministry on the establishment of a museum education service.

1.9 A series of seminars was held twice weekly throughout the period of the mission. Biology teachers were systematically trained in modern methods of teaching, techniques of evaluation, organisation of field teaching and school visits, curriculum reform and in the development of improvised apparatus.

1.10 Associated with the seminar programme a short part-time in-service course was presented in teaching methods and techniques of examining. This was intended as a model to give seminar members training and experience in the organisation of such programmes.

1.11 A five year plan for biology teaching in Mauritius was worked out by the teachers. They devised a new syllabus in biology for the Cambridge School Certificate based on materials and methods developed by the Unesco Pilot Project for Biology Teaching in Africa. A scheme for developing resource materials for the new course was devised and a programme of trialling and evaluating these materials was organised in some detail. A programme of future in-service activities was also organised by the teachers. The new syllabus and its associated programme of production, trials, evaluation and in-service activities was formally approved by the Ministry of Education on the 10th December, 1969.

SECTION 2. Terms of Reference and Their Interpretation

2.1 The terms of reference in the contract with Unesco were as follows:
".... in close collaboration with the Mauritius Ministry of Education:

- undertake a two months and a half mission in Mauritius, in order to advise the Ministry and the two study groups established in Port Louis and in Curepipe, in the way of organising a trial and evaluation programme for in-service training workshops and classroom trials with the material produced in Cape Coast (Ghana) within the framework of the Biology Teaching Pilot Project in Africa;

- assist in the organisation and running of at least one in-service training workshop, and will train study groups in the way of planning curriculum research, experience, suitable examination techniques and tests;
- investigate possibilities for producing suitable educational broadcasting and television programmes for biology teachers, science teaching in general, and possibly also for the public at large, particularly for adults in rural areas;
- make recommendations for a long-term programme of activities for both study groups to be integrated through a national co-ordinator into one unified programme.

Upon completion of his mission, he will submit to Unesco in 50 copies, a full report on his mission, including his assessment of the situation and his recommendations for improvement."

2.2 In addition, a letter was received from the Permanent Secretary, Ministry of Education, Government of Mauritius dated 25th June, 1969 (reference TA/61/14/1) giving some information on the current work of the local study groups and requesting, during the mission, advice on the following items.

A. Teachers' Workshops:

i) preparation of local-made apparatus from rudimentary material e.g. potometer, aerator, klinostat, auxanometer, graduated pipettes and burettes, incubator, microprojector;

ii) preservation of specimens: insects and other animals, plant material for laboratory use and displays;

iii) preparation of models, lantern slides, transparencies, films or film loops on a low budget;

iv) pure cultures of micro-organisms: bacteria, fungi ....

B. Ecology - Outings:

  i) Methods for general ecology (transects, quadrats), autecology. Analysis of soil samples, dry weight of litter, determination of oxygen concentration and pH.

  ii) Quantitative ecology - statistical methods and estimates of populations.

C. Planning of Laboratories for Teachers' Training College: Courses for teachers of private secondary schools. Can these be carried out locally, or may scholarships be made available for training at an overseas centre - Institute of Education or Ecole Normale Superieure.

2.3 After arrival in Mauritius on the 28th September, 1969, and after detailed discussions with Mr. Joomaye, Education Officer in charge of biology, it was agreed that it would not be possible in the time available to cover all the points requested in the letter from the Ministry of Education of the 25th June, 1969. It was further agreed that first priority should be given to the terms of reference set out in the Unesco contract (see paragraph 2.1), and that in carrying out this work, opportunities should be taken whenever possible to complete some of the tasks requested in the Ministry's letter of the 25th June. It was agreed that the main objective as set out in the Unesco contract, should be to organise the two biology study groups into a single executive group capable of various activities such as in-service training; curriculum reform; trialling and evaluating new courses; and producing and using lessons in biology for educational television. It was further agreed that we should work towards organising some permanent administrative arrangement that would organise and maintain the activities as part of a unified programme under the directions of a national co-ordinator.

2.4 With regard to educational television (E.T.V.), local circumstances had changed since signing the present contract in April 1969. In mid-July 1969, the Government of Mauritius announced that regular E.T.V. broadcasts would be given on each school day of September and October 1969 to provide revision lessons for the Cambridge

School Certificate Examinations. An expert in E.T.V. from the *Centre for Educational Television Overseas (CETO)* in London would be in Mauritius to help with these broadcasts and to advise on establishment of a permanent unit. After discussions with Ministry officials it was agreed that the terms of reference in regard to E.T.V. and radio should be interpreted to allow:

i) preparation of a general advisory report on educational radio and E.T.V.;
ii) an evaluation of the current series of E.T.V. programmes;
iii) discussion and co-operation with the CETO expert, and
iv) organisation within the biology study group of some structure or administrative unit that would facilitate continued production of E.T.V. lessons on biological topics.

2.5 A summary of activities undertaken during this mission is presented as Appendix A. A list of personnel closely involved in the project is given as Appendix B.

See Appendix A
See Appendix B

SECTION 3. The Educational System in Mauritius with Special Reference to Biology in Secondary Schools

3.1 In Mauritius, six years of primary schooling are followed by five years secondary education for the School Certificate and two further years for the Higher School Certificate of the University of Cambridge. Eighty-nine per cent of the total population of children aged 5+ to 11+ were attending primary school in 1968. Government secondary schools catered in 1968, for 2,562 pupils and there were 6,372 pupils in independent aided secondary schools and 30,793 in independent non-aided schools.

3.2 The curriculum is fairly traditional and examinations are of the conventional type stressing recall of facts.

3.3 Biology in primary schools has until now been taught as part of a programme of natural history, but this has not been given a great deal of stress because it is not a subject for the Primary School Leaving Certificate Examination and because teachers have not been especially trained for this course. In 1970, a syllabus in elementary science will be introduced to trial primary schools with the intention of making it a compulsory part of the curriculum later. It contains well organised strands of biology.

3.4 In secondary school, biology is relatively unpopular. In 1969, 9,901 pupils sat for the School Certificate Examination and only 588 of these took biology. On the other hand, 3,231 pupils sat for chemistry and 996 sat for physics. For the Higher School Certificate Examination of 1969, there were 969 candidates and of these only 64 took biology as a principal subject, compared with 456 for chemistry and 402 for physics.

3.5 While the State teachers' college offers a good training programme for primary teachers, there is no degree programme or teacher training course available in Mauritius for secondary teachers. It was possible to identify 35 secondary biology teachers in Mauritius in 1969. Of these, 13 were graduates and only one had had teacher training.

3.6 The University of Mauritius offers courses in agriculture, industrial technology and administration. The School of Agriculture has facilities to help teachers of biology. There is, however, at this time, no Central Institute of Education or Science Teaching Centre to co-ordinate activities such as teacher education; in-service training; curriculum research and reform; production of television and radio programmes for schools; development of resource materials such as texts and audio-visual aids; organisation of materials supply for biology or the production of prototype equipment made from inexpensive local materials. There is an urgent need for such an institution.

3.7 The following problems need attention if Biology is to become popular and successfully taught in the secondary schools of Mauritius.

1. Curriculum: The present academically biased syllabuses for the Cambridge School Certificate and Higher School Certificate should be replaced by locally developed courses stressing local materials and local environment. The new courses should contribute to personal and national development.
2. Examinations: The more traditional "fact-oriented" examinations should be replaced by modern style exams testing for higher level achievement in comprehension, application, analysis, synthesis and evaluation of knowledge.
3. Pre-Service Training: A school of education, a science teaching centre or an institute of education should be established to give teacher training to graduates in Biology and to co-ordinate additional training of teachers of Physics and Chemistry who should be encouraged to also teach Biology.
4. In-Service Training: Biology teachers need continuous in-service assistance because their subject is rapidly changing with new emphases not only in content but also in curriculum and teaching method. In the absence of a co-ordinating institute of education, Biology teachers themselves should organise in-service activities.
5. Production of Local Resource Materials: Local texts, biological keys, descriptions of local environments and of local plants and animals are urgently required. An education service at the Mauritius Institute (The Natural History Museum) would do much to overcome this problem.
6. Production and Supply of Simple Apparatus: Contrary to the majority opinion, I do not believe that Biology requires a great deal of specialised or expensive equipment. There is need, however, for a central institution (e.g. Institute of Education) to make prototypes of simple apparatus and to train teachers in making and using this equipment.

7. Educational Television and Radio Broadcasts for Schools: The present series of revision programmes on television (September to October 1969) has been a good start but television programmes are relatively ineffective educationally unless closely integrated into the lesson structure of the school. Educational television also requires especially trained television teachers and institutional support for high quality production. School radio broadcasts should be developed to provide specific lessons on biological topics for specified grades.
8. Audio-Visual Aids: Biology is essentially a visual subject and requires strong support from a central audio-visual production unit. Such a unit should help with the manufacture of projector slides, charts, transparencies for overhead projection, 8 mm movies, audio tapes, and other aids.
9. Need for Overall Co-ordination: In the development of an overall plan for biology teaching there is need for close co-ordination and supervision of the various types of activities listed above. Such co-ordination could be provided by a central academic organisation such as an Institute of Education or a Science Teaching Centre.

SECTION 4. The Position of the Unesco Biology Study Groups as at 1st October, 1969

4.1 Two study groups had been established in Mauritius in September 1965 to help with aspects of the Unesco Pilot Project for Biology

Teaching in Africa. One study group was centred at Royal College Port Louis and the other sixteen miles away at Royal College Curepipe. Group leaders were Mr. M.H. Joomaye in Port Louis, and Mr. N. Assarapin in Curepipe. There were originally six graduate biology teachers in the study groups at Port Louis and seven in the Curepipe group. Reference libraries were established by Unesco at both centres. In 1967, Mr. Joomaye represented these study groups at the meeting of the International Working Group at Cape Coast Ghana.

4.2 In the earlier years of the seminar the groups were mainly concerned with producing drafts of materials for consideration by the International Working Group. More recently, the two groups investigated ways and means of making most effective use of the Unesco materials.

4.3 The teachers prepared extracts from the Unesco materials of relevance to the Cambridge School Certificate syllabus in biology. They organised lesson notes and notes on field studies with these Unesco materials as the main references. Various sheets on methods of teaching were produced for the benefit of biology teachers in Mauritius and for the International Working Group Project September 1967 to June 1968.

4.4 The study groups developed an advisory teaching programme for each year of the five year course for the Cambridge School Certificate. This was distributed to all schools teaching biology in Mauritius and made as much use as possible of the ideas in the Unesco materials.

4.5 Some work was undertaken to make a modest set of prototype visual aids. Some studies were also made of local animals and plants with the view of ultimately replacing British types in the Cambridge syllabus by exclusively local types.

4.6 At the time of my arrival in Mauritius on the 28th September, 1969, there was already in existence, therefore, the nucleus of an actively working group of biology teachers. These teachers were interested in and anxious to help with curriculum reform, in-service training and other activities directed towards improving biology teaching in Mauritius. This, then, provided an excellent basis for the various activities undertaken during the period of this mission, 28th September to 15th December, 1969. Membership in October 1969 was the same as in 1965 with the same group leaders. Mr. Joomaye, however, had left Royal College, Port Louis for the position of Education Officer in the Ministry of Education.

SECTION 5. Methods Adopted to Achieve the Objectives of the Consultancy Programme: September/December 1969

5.1 It was decided that most effective progress would be made by working directly with the study group members and to build on what they had already achieved. The two groups were therefore amalgamated and a programme of seminars was planned for twice a week from the 7th October to 12th December, 1969. These seminars were held at Queen Elizabeth College at Rose Hill on Tuesdays and Fridays from 4.15 to 6.30 p.m. On Tuesdays general problems of biology teaching were considered, and on Fridays there were special meetings on problems of teaching those topics based on the materials produced by the Unesco Pilot Project for Biology Teaching in Africa. In this latter series, teachers were asked to prepare and present practical demonstrations for critical discussion by other members of the group.

5.2 A basic purpose of the seminars was to train teachers in the techniques of curriculum design and in the procedures for trialling and evaluating a new course of studies. At the same time, the course aimed at giving guidance in organising and running in-service training courses, stressing modern techniques of teaching such as "discovery" learning, use of audio-visual aids including television, and methods of environmental teaching by means of field excursions. The ultimate purpose of the seminars was to establish a permanent group of professional educators capable of improving biology teaching with co-ordinated activities under the guidance of a national leader. Actual proposals for organising such a structure are set out in SECTION 10 below, and full details of implementing the proposals are described in SECTION 11.

5.3 Associated with the seminars a survey was made of the potential for teaching environmental science and a training programme in the techniques of field teaching was undertaken. This is described in SECTION 6.

5.4 In order to meet the terms of reference in regard to television and radio, work with the seminar group included discussion and evaluation of current television programmes in biology. This is described in SECTION 7.

5.5 To encourage close co-operation between teachers and the natural history museum, some training in using museums as teaching resources was undertaken. A proposal was made to the Ministry of Education on the establishment of an education service at the Mauritius Institute in Port Louis. This part of the work is described in SECTION 8.

5.6 The seminars were also used as opportunities to introduce, *in context*, simple pieces of equipment improvised from inexpensive materials. This was to encourage teachers to develop their own simple apparatus. This aspect of the programme is discussed briefly in SECTION 9.

5.7 Apart from work directly linked to the seminars, regular discussions were held with officials of the Ministry of Education, professional biologists, educators and teachers and a series of advisory documents was prepared for consideration by the Ministry of Education.

SECTION 6. The Status of Environmental Teaching in Mauritius

6.1 An emphasis on ecology and on a study of the environment of man is central to the approach recommended by the Unesco Project. Most Mauritian teachers, however, have not had experience in field teaching or in the organisation of lessons away from the school, or even in giving biology lessons in the school grounds.

6.2 Surveys were made of the Island to locate suitable sites for field excursions. Mauritius is especially well endowed with suitable excursion areas. There are excellent streams, sandy beaches, lakes and introduced and indigenous forests. While the agriculture is predominantly sugar cane and to a lesser extent tea, there is a variety of agricultural activities suitable for school study.

6.3 Visits were made to various biological institutions to find those suitable for school projects or for co-operation in providing information and advice for teachers. Institutes with excellent resources included the University of Mauritius School of Agriculture; the Ministry of Agriculture, Department of Entomology; the Mauritius Sugar Industry Research Institute; the Mauritius Herbarium; the Botanical Gardens at Pamplemousses and the Central Laboratory of Candos Hospital. All these institutions expressed willingness to co-operate with biology teachers.

6.4 Prototype field excursions were designed and teachers, and in some cases pupils, were taken on a series of field excursions. Each excursion was followed by laboratory work. A prototype lesson was also given on using the school grounds for discovery type learning in biology. The excursions were very successful and teachers were surprised at how much data could be obtained in a short visit to a field site using simple apparatus.

6.5 The various activities in environmental teaching were described in a report to the Ministry. This report also made recommendations for strengthening this type of teaching in Mauritius. These recommendations included suggestions for in-service programmes; comments on the need for publications describing the local fauna and flora; and appropriate administrative arrangements in schools to permit excursions in school hours. This report has been included as Appendix D.

See Appendix D

SECTION 7. Educational Radio and Television in Mauritius with Special Reference to Science Teaching

7.1 The production and use of educational television and radio programmes were surveyed in some detail from the 30th September to 31st October, 1969. The work on E.T.V. was undertaken co-operatively with Mr. George Grimmett of the Centre for Educational Television Overseas. It was indeed a great pleasure to find a colleague so expert in this field and I would like to express thanks to CETO and to Mr. Grimmet for close and valued co-operation.

7.2 On the whole, biology teachers made little use of school radio broadcasts but were very satisfied with a current series of evening television programmes designed as a revision course for the Cambridge School Certificate Examination. Science teachers, however, generally considered that television lessons should be given during the day and be closely integrated into the school programme. Notes should be issued to help teachers use the television lessons.

7.3 Production facilities for radio broadcasts are reasonably adequate at the Audio-Visual Unit of the Ministry of Education. At present, however, that unit does not have adequate resources for development as a full scale E.T.V. unit.

7.4 A scheme for educating rural adults by radio and television was considered. Activities of the National Federation of Young Farmers Clubs and the Clubs of the Youth Services Division of the Ministry of Education (since December administered by the new Ministry of Youth and Sports) would provide an ideal framework for developing meaningful programmes for young adults in rural areas.

7.5 A report on radio and E.T.V. in Mauritius education was presented to the Ministry of Education. This report included recommendations on the need for closer integration of lessons into the school teaching programme; on the need for establishing a strong separate unit for E.T.V. production, possibly linked to an Institute of Education; on the need to have a video-tape recorder to enable replays and to improve production; and on the development of special programmes for teachers and for adults in rural areas. This report is presented as Appendix E.

See Appendix E

SECTION 8. Development of the Natural History Museum (Mauritius Institute) in Port Louis for the Teaching of Biology

8.1 The Mauritius Institute in Port Louis is an excellent natural history museum. It has public galleries with good exhibits of animals of Mauritius. It has both systematic and ecological themes.

8.2 Few biology teachers had used the museum systematically for lessons. Teachers were, therefore, given instructions in using the museum and a special visit with specific teaching objectives was arranged with the full co-operation of the Director, Mr. Claude Michel. This was a most successful part of the training programme. Teachers were surprised and pleased to discover how useful museums could be as teaching resources.

8.3 A report was made to the Ministry of Education on the facilities of the Mauritius Institute. Recommendations were made in the report on the establishment of an education service at the Museum. This was agreed to in principle by the Ministry but no details were finalised. The report is attached as Appendix F.

See Appendix F

SECTION 9. Development of Simple Equipment and Apparatus for Biology Teaching

9.1 A number of simple pieces of apparatus was especially developed for this mission by Mr. David Griffiths of the educational laboratories of the Centre for Advancement of Teaching at Macquarie University in Sydney. Models and/or specifications for each piece of equipment were brought to Mauritius for use by biology teachers. The advice on the development of this apparatus was specifically requested in a letter from the Ministry of Education dated 25th June, 1969 (see SECTION 2).

9.2 The equipment was introduced wherever appropriate in the seminar series for biology teachers from October to December 1969. The purpose was to encourage teachers to develop their own apparatus from inexpensive local materials.

9.3 Mr. H.R. Mills, Unesco Expert with I.L.O. Project "National System of Vocational and Technical Education" kindly assisted in this work by developing and demonstrating a simple and effective microprojector made from readily available components. The co-operation of I.L.O. and of Mr. Mills in this is gratefully acknowledged.

9.4 A report on this special apparatus is given here as Appendix G.

See Appendix G

SECTION 10. Establishment of a Permanent Group of Biology Teachers and Professional Biologists to Co-ordinate Programmes of Improving Biology Teaching

10.1 The Ministry of Education approved the formation of a permanent executive group of biology teachers by fusing and augmenting the two original study groups. This group was then organised into various sub-committees to plan and implement various activities such as syllabus construction, development of resource materials, trials and evaluation of new courses; correlation of Unesco booklets and related materials with the syllabus of the Cambridge School Certificate; and organisation of programmes of in-service training.

10.2 A proposal to the Ministry of Education to appoint an honorary advisory committee of professional biologists was approved and such a group was formally constituted on the 26th November, 1969.

10.3 The proposal to the Ministry on the establishment of the groups included a summary of seminar and in-service activities of the biology teachers. A copy is given here as Appendix H.

See Appendix H

SECTION 11. Development of a Five Year Plan for the Improvement of Biology Teaching in Mauritius

11.1 At a special full-day workshop of biology teachers at Queen Elizabeth College on Saturday, 29th November, various sub-committees to organise activities listed in paragraph 10.1 were formally constituted.

11.2 Each sub-committee discussed proposals for possible future activities and worked out in some detail a full programme to 1974.

11.3 The most important achievement of the workshop was the development of an outline syllabus for a biology course for Mauritius to replace the present syllabus of the Cambridge School Certificate. The new syllabus was the culmination of the seminar series and was based in large part on the ideas of the Unesco Pilot Project for Biology Teaching in Africa. At the same time a programme of developing, trialling and evaluating resource materials was worked out in some detail. A programme of in-service activities for 1970 was organised by the teachers. Activities supporting biology lessons on television were finalised at a subsequent meeting on Friday, 5th December, 1969.

11.4 Full details of the workshop held on the 29th November are included in Appendix I. In this Appendix, outlines of proposed activities are included. This Appendix also contains the new syllabus proposed for the School Certificate course in Mauritius.

See Appendix I

11.5 Final meetings on the 3rd, 4th and 10th of December respectively brought together the separate elements of the consultancy mission into a final approved programme. On the 3rd of December the biology consultants met officially with the biology teachers. The activities worked out on the 29th November were further consolidated and the professional biologists pledged their full co-operation. On the 4th of December, the Advisory Board of Education (Ministry of Education) was given an account of the seminars, training courses, curriculum activities and proposed new syllabus developed by the biology teachers. There were favourable comments on the work achieved. The Permanent Secretary, Mr. Frank Richard who chaired the meeting suggested that the pattern may perhaps serve as a model for curriculum reform in other subjects.

11.6 On the 10th of December a special meeting of the Curriculum Research and Reform Committee of the Ministry of Education was convened to consider the proposals for a new syllabus in biology for Mauritius together with trials and evaluation of the new course. I am very pleased to be able to report a most favourable reaction from the committee. The syllabus was approved and it was agreed to introduce it into three pilot classes in 1970. It was also agreed that the proposals for developing and evaluating new resource materials for the course should be implemented. Finally, it was agreed to approach the examinations syndicate of the University of Cambridge through Unesco for approval of the new syllabus as an experimental programme for Mauritius with a special examination to be set for 1974.

11.7 Further details of these three key meetings are given in Appendix J.

See Appendix J

11.8 By December 10, 1969, then, the major objectives of the mission had been accomplished. Biology teachers had been trained in techniques of curriculum reform and in evaluation. They had been formed into a permanent working group under the co-ordination of a National Leader. Work had been completed in the fields of television and radio; environmental teaching; methods of teaching and development of apparatus. A new biology syllabus had been prepared and officially approved and an experimental teaching programme for the new course had also been devised and approved.

APPENDIX A

Government of Mauritius,
Ministry of Education and Cultural Affairs

STATEMENT BY DR. G.R. MEYER, UNESCO CONSULTANT ON HIS PROGRAMME OF ACTIVITIES
28th SEPTEMBER TO 15th DECEMBER, 1969

	Activity	Date Started	Date Finished
1.	Becoming familiar with background materials, e.g. Unesco Pilot Project for Africa; texts and other resources. Annual Report on Education in Mauritius 1967/68 Triennial Survey of Education in Mauritius 1964 to 1966. University of Cambridge : syllabuses and examinations for School Certificate and Higher School Certificate. School syllabuses and programmes in biology for Forms I to V.	29.9.69	20.10.69
2.	Initial survey of educational system. Visits to various types of schools and other educational institutions. Escorted by Mr. M.H. Joomaye.	29.9.69	12.10.69
3.	Visits to schools teaching biology for observations of lessons and for discussions with and advice to biology teachers. Co-operatively with Mr. M.H. Joomaye.	12.10.69	8.12.69
4.	Seminars and training programmes for biology teachers on general problems of teaching and on the implementation of Unesco Pilot Project. Co-operatively with Mr. M.H. Joomaye. Twice weekly 4 - 6.30 p.m.	7.10.69	12.12.69
5.	Part-time in-service training course for biology teachers, 4 - 6.30 p.m. on "Introducing the Unesco Pilot Project to Mauritian Schools". Co-operatively with Mr. M.H. Joomaye.	15.10.69	21.10.69

	Activity	Date Started	Date Finished
6.	Field survey of the Island to locate suitable sites for excursions to teach aspects of environmental biology. Assessment of the present position of environmental teaching and recommendations for future development of this aspect.	6.10.69	27.11.69
	Submission of recommendations to Ministry.		1.12.69
7.	Whole day excursions for biology teachers to:		
	freshwater stream		19.10.69
	forests		26.10.69
	cane fields		16.11.69
	sea shore		30.11.69
8.	Discussions with the Director of the Mauritius Institute and with Ministry of Education on a possible education service at the museum.	6.10.69	7.11.69
	Submission of recommendations to Ministry.		14.11.69
9.	Discussions with Mrs. A. Hunwald, Unesco, on aspects of present project in Mauritius. Visits with Mrs. Hunwald and Mr. M.H. Joomaye to schools and other centres of biological teaching and research.	18.10.69	26.10.69
10.	Lectures to specific groups (by invitation) :		
	i) To examiners of Senior Primary School Leaving Certificate meeting at the Senior Primary School Belle Rose, Quatre Bornes - "Modern Trends in School Examinations".		13.10.69
	ii) To staff of University of Mauritius - "Evaluating the Progress of University Students".		30.10.69
	iii) To staff of the Visual-Aids Unit of the Ministry of Education - "A Visual-Aids Unit for Schools and University".		10.11.69

	Activity	Date Started	Date Finished
iv)	To biology staff and senior biology students of St. Mary's and Queen Elizabeth Colleges, Rose Hill - lecture and full day field excursion on "Biology of the Sea Shore".		19.11.69
v)	To senior students of Royal College Curepipe - lecture and full day field excursion on "Techniques of Freshwater Biology".		22.11.69
vi)	To invited audience of 100 teachers at Trinity College, Port Louis - "Visual-Aids in the Secondary School".		24.11.69
vii)	To staff of the University of Mauritius - "New Trends in Audio-Visual Aids in University Teaching".		4.12.69
11.	Planning realistic trials and evaluation of Unesco materials to be used in schools in 1970 (discussions with study groups and Ministry).	15.10.69	29.11.69
	Submission of recommendations to Ministry.		29.11.69
12.	Organisation of the two separate study groups into a single *permanent executive group* to give leadership to biology teaching in Mauritius.	7.10.69	29.11.69
	Submission of recommendations to Ministry.		29.11.69
13.	Formation of a *Consultative Committee* of professional biologists to advise biology teachers.	15.10.69	29.11.69
	Submission of recommendations to Ministry.		14.11.69
14.	Discussions with representatives of Ministries of Education and Agriculture and with the representative in Mauritius of the Centre for Educational Television Overseas (CETO) on the role of educational broadcasts and television	7.10.69	29.11.69

Activity	Date Started	Date Finished
in school biology, school science in general and in the education of adults in rural areas. Submission of recommendations to Ministry.		29.11.69
15. Attendance at formal committee meetings (by invitation) :		
i) Preliminary meeting called by Ministry of Education to consider formation of a consultancy group for biology teaching.		26.11.69
ii) Selection Board of the Ministry of Education to consider applicants for the Unesco Fellowship to attend the International Working Group Seminar on Plant and Soil, Tananarive, 9th February to 5th April, 1970		28.11.69
iii) Inaugural meeting of the Biology Consultancy Committee, Ministry of Education.		3.12.69
iv) Ministry of Education, Advisory Committee on Education.		4.12.69
v) Special meeting of the Curriculum Reform Committee of the Ministry of Education to consider a proposed new syllabus for Cambridge School Certificate based on Unesco materials.		10.12.69
16. Developing a "Five Year Plan" for biology teaching in Mauritius. Procedures and recommendations regarding :	7.11.69	5.12.69
i) Designing and implementing of a new biology syllabus for Mauritius, perhaps utilising Unesco Pilot Project materials.		
ii) Arranging and evaluating trials of new materials produced for new courses in biology		
iii) Developing continued programmes of in-service training in biology teaching.		
iv) Developing educational radio and television as a resource for biology teaching and science teaching in general.		
Submission of recommendations to Ministry.		10.12.69

APPENDIX B

PERSONNEL CLOSELY INVOLVED IN THE CURRENT MISSION, BIOLOGY TEACHING IN MAURITIUS

I. Officials of the Ministry of Education and Cultural Affairs

Hon. Rajmohunsing Jomadar	: Minister of Education and Cultural Affairs
Mr. Frank Richard	: Permanent Secretary, M/Education and C.A.
Mr. Sandra Murday	: Chief Education Officer
Mr. George Telescourt	: Senior Education Officer
Mr. Mamode H. Joomaye	: Education Officer
Mr. Moteelall Burton	: Examinations Officer
Mr. P. Edwin Louise	: Senior Executive Officer (Examinations)
Mr. K. Ragoonaden	: Audio-Visual Education Organiser
Mr. L.P. Ramyead	: Principal Assistant Secretary
Mr. C. Cure	: Principal of Teachers' Training College
Mr. D. Khoyratty	: Assistant Secretary

II. Professional Biologists

Dr. O. Wiehe	: Vice-Chancellor, University of Mauritius
Professor A.H. MacDonald	: Professor of Agriculture, University of Mauritius
Mr. L.F. Edgerley	: Public Service Commission, Forest Side
Dr. R.E. Vaughan	: Director, Mauritius Herbarium
Dr. C. Ricaud	: Plant Pathology Department, Mauritius Sugar Industry Research Institute, Reduit
Mr. C. Michel	: Director, Mauritius Institute
Mr. C.H. Courtois	: Government Entomologist, Central Laboratory, Candos
Mr. B. Jugnarain	: Superintendent, Botanical Gardens, Pamplemousses

III. Biology Teachers

See Appendix H	: Attachment One

APPENDIX C

NOTES AND RECOMMENDATIONS ON EDUCATION IN MAURITIUS WITH SPECIAL REFERENCE TO SECONDARY SCHOOL BIOLOGY

by

G.R. Meyer, Unesco Consultant

SUMMARY

1. In Mauritius there is an independent pre-school system and six grades of primary school, the latter almost all state controlled. There are five years of secondary school leading to a School Certificate (Cambridge), followed by two years of sixth form leading to Higher School Certificate.
2. The school curriculum is fairly academic with little emphasis on applied or practical subjects. Sciences are widely taught, but biology is relatively unpopular compared with physics and chemistry.
3. Most examinations are of the traditional type stressing recall of factual knowledge.
4. Teacher education for primary schools is satisfactory, but there is no adequate provision in Mauritius for training secondary biology teachers. There is inadequate provision for in-service activities.
5. At present the University of Mauritius has only Schools of Agriculture, Administration and Industrial Technology. The School of Agriculture has facilities to help biology teachers.
6. There is urgent need for an Institute of Education or Science Teaching Centre to co-ordinate various activities involved in the development of science teaching.

I. General Description of Educational System

Programme of Visits

From October to December 1969 a series of visits was made to schools and other educational institutions. Institutions visited are listed in Attachment One.

See Attachment One

The School System

Pre-school education is organised privately and there are 668 registered nursery schools for children of three to five years of age.

Primary schooling is in six grades for children 5+ to 11+. In 1968 there were 138,295 pupils in the 176 Government Primary Schools, and 55 Aided Primary Schools. In addition, 4,664 children were attending Unaided Primary Schools. While primary schooling is not compulsory, attendance is high. The 142,959 children attending Primary Schools in Mauritius in 1968 represented about 89 per cent of the total population of children aged 5+ to 11+. The holding power is good. 31,564 candidates sat for the Primary School Leaving Certificate in 1968 (Standard VI) and 13,372 passed. 8,957 completed the Junior Scholarship Examination in 1968, competing for 200 scholarships for secondary education.

Three State Senior Primary Schools provide a free three-year post-primary programme with a bias towards crafts.

Secondary schooling is geared to the requirements of University of Cambridge Examinations for the School Certificate and the Higher School Certificate. There are, therefore, five years of secondary schooling leading to School Certificate and two further years (Upper and Lower Sixth Form) for the Higher School Certificate.

In 1969 there were four Government Secondary Schools in Mauritius with an enrolment of 2,562 pupils in 1968. In 1968, there were also thirteen grant-aided schools catering for 6,372 pupils and a large number of private non-aided secondary schools catering for School Certificate standard only with an enrolment of 30,793.

The total enrolment in secondary schools increased from 35,508 in 1967 to 39,703 in 1968.

The School Curriculum

In the primary school there is a core of compulsory examination subjects occupying 2 hours and 40 minutes of the school week. These subjects are English, French, Arithmetic and Geography. Non-examination subjects usually include Nature Study, Civics, Singing, Physical Education, Handwork and for some pupils, an oriental language, usually Tamil, or Hindi or some other Indian language.

In senior primary schools, all subjects are compulsory. English, French, Mathematics, General Science, Geography and History, Art, Woodwork and Metalwork are taken for the special Senior Primary School Leaving Certificate.

For the School Certificate, seven or eight subjects are taken. While the pattern varies slightly from school to school, the programme at Royal College Curepipe is representative of schools with good standards. Here there is a compulsory core of English, English Literature, French and Mathematics together with *either* Physics and Chemistry and one other (perhaps Biology) *or* Latin and Greek and one other. The great majority of students take the Science subjects.

For the Higher School Certificate schools usually present two streams, Arts and Science, and once again the pattern at Royal College Curepipe is fairly representative. At Royal College, one set within the Science stream takes Physics, Chemistry and Biology plus Subsidiary Mathematics and another set takes Mathematics and Chemistry plus one of Physics, Biology or Geography plus one subsidiary subject usually French. The Arts stream takes English together with either French or Greek, Latin or History, Geography and either subsidiary Mathematics or some other subsidiary subject.

The main exception to this basic pattern is John Kennedy College, a State School which includes trade subjects (Metalwork, Woodwork, Technical Drawing and commercial subjects). There are no classical or literary subjects provided at this school.

The non-aided independent schools frequently replace the more rigorous academic subjects with courses such as British History to 1688, Art or Bible Knowledge.

The Place of Biology in the Curriculum

In primary schools an unstructured programme of nature study has been provided for a number of years but has not been a central part of the curriculum. In 1970, a new programme of Elementary Science is to be introduced into Grades III and IV with the ultimate objective of extending it to Grade VI as a compulsory subject for the Primary Leaving Certificate. This syllabus contains a high proportion of Biology with a human and environmental bias. It should be an excellent course in the general education of primary pupils and should also provide a basis for secondary school Science.

In secondary schools, Biology is available as an elective subject for the School Certificate and is relatively unpopular. The following table lists the numbers of candidates taking the compulsory English paper, the Science subjects and certain non-Science subjects for the School Certificate Examination of 1969.

Number of Pupils Taking School Certificate Examinations in Mauritius in Selected Subjects (1969)

Subject	
English Language+	9901
English Literature	8181 + 584 (alternative 1 and 2 respectively)
French Language	9673
French Literature	4392
Chemistry	3231
Physics	996
Biology	588
History*	5417(1); 2086(2); 164(3); 244(4)
Geography	450

*Note: (1) To 1688 (British and European)
(2) 1485-1815 (British and European)
(3) 1688-1939 (British and European)
(4) British Empire and Commonwealth

+Virtually compulsory

For the Higher School Certificate Biology is far less popular than Physics or Chemistry in the Science streams. Even in schools with a strong tradition of Biology teaching, numbers taking the examination are relatively low.

Royal College Curepipe, with a fairly strong tradition of Biology presented 65 out of 85 candidates for Biology at the School Certificate and only 20 out of 94 for the Higher School Certificate in the 1968 examinations. This proportion would be considerably above average for Mauritius.

In Mauritius in 1969, 969 candidates sat for the Higher School Certificate Examination. Of these 546 took Chemistry at Principal (A) Level and one at subsidiary level; 402 took Physics, all at (A) Level; 64 took Biology at (A) Level and 42 at subsidiary level. In addition, a few took separate Botany or Zoology. Ten took Botany at (A) Level and 3 at subsidiary. Four sat for Zoology, all at (A) level.

As an indication of the relative popularity of various subjects for the School Certificate and Higher School Certificate at Royal College Curepipe, the examination results of that school for 1968 are presented as Attachment Two.

See Attachment Two

Reference to earlier examination statistics indicated a gradual increase in the proportions taking Biology over the past five years; but the subject is still (1969) not as popular as Physics or Chemistry.

While the course for the School Certificate is prescribed by the Examinations Syndicate of the University of Cambridge*, most schools develop their own teaching programmes, sometimes including Biology in a General Science sequence for Forms I to III, but sometimes restricting General Science to Form I only. These programmes are often inadequately structured and could easily lead to Biology being taught as isolated fragments of factual information. In any event, the Cambridge syllabus, while providing a reasonable general coverage of Biology, is unrelated to the specific problems and needs of Mauritius. A teaching programme for Forms I to IV in a fairly representative independent aided school is given as an example of the type of approach used in many schools.

See Attachment Three

Examinations

The examinations set by the Ministry of Education for the Primary School Leaving Certificate and the Senior Primary School Leaving Certificate and by the schools themselves for annual examinations, are fairly conventional and stress tests of factual knowledge. This is particularly the case in Biology where most examination questions are of the essay or short answer type testing memory work.

See Attachment Four

Teacher Education

Primary and Senior Primary teachers are non-graduates, mostly with a School Certificate only but a few with Higher School Certificate. They are trained in the State Teachers' College, Beau Bassin which has an annual intake of 370 students including about 100 for oriental languages. The curriculum is very broad including about twenty subjects treating both content and methods of teaching. The course is of two years with one year at the College and one in supervised practical teaching in schools. A course of Science with some Biology is included in the curriculum and from 1970 there will be a special programme to prepare teachers for the new course in Elementary Science to be introduced to trial schools also in that year.

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* University of Cambridge Local Examination Syndicate. *Syllabuses Science Subjects 1969 and 1970 Joint Examination for the School Certificate and General Certificate of Education.* Cambridge May, 1968, pp. 84 - 94.

The training of secondary teachers is unsatisfactory since the University of Mauritius does not as yet offer suitable degree courses for teachers. Only 13 of the 35 Biology teachers attending the Unesco seminars (October to December 1969) were graduates and all had been trained overseas in England, India or elsewhere. Only one had had teacher training. Because of the lack of institutional academic leadership, secondary Biology teachers find it difficult to obtain in-service training or to develop new teaching materials.

The University of Mauritius

At present there are three schools - Administration, Agriculture and Industrial Technology - offering Diplomas (2 or 3 years) or Degrees (3 or 4 years). The School of Agriculture, for example, at present (1969) offers a three year Diploma in Agriculture. In 1970 it will be possible for students to take an extra year and to transfer from Diploma to Degree studies, provided certain minimum requirements are met.

At present the University does not have an Institute of Education but preliminary proposals for such an Institute are at present under consideration.

Biology teachers can be given informal assistance by the School of Agriculture which is prepared to assist with in-service training, the development of resource materials, practical facilities and with advice and information.

5.12.69

Attachments
1. Programme of visits to schools and other educational institutions.
2. Examination results 1968 Royal College Curepipe.
3. Teaching programme for Biology Forms I to IV in an independent non-aided school.
4. Annual examination paper in Biology for Form IV from an independent non-aided school.

Attachment One

PROGRAMME OF VISITS TO SCHOOLS AND OTHER EDUCATIONAL INSTITUTIONS
OCTOBER TO DECEMBER 1969

I. Visits to Schools

	School	Principal	Date of Visit
1.	Islamic Cultural College 60 Edgar Laurent Street, Port Louis.	Mr. J. Hossenbaccus	29th September, 1969
2.	Royal College Curepipe.	Mr. B. Bathfield	29th September, 1969
3.	St. Andrew's College Rose Hill.	Rev. Rex Donat	30th September, 1969
4.	Bhujoharry College St. George Street, Port Louis.	Mr. J.A. Bhujoharry	30th September, 1969
5.	Senior Primary School Engineer Street, Port Louis.	Mr. H. Catherine	30th September, 1969
6.	Queen Elizabeth College Vandermeersch Street, Rose Hill.	Miss M. Kishtoe	1st October, 1969
7.	Central (Senior Primary) School Belle Rose, Quatre Bornes.	Mr. B. Dabee	1st October, 1969
8.	John Kennedy College Vuillemin, Beau Bassin.	Mr. C. Bell	1st October, 1969
9.	Mont Roches Government School (Primary) Beau Bassin.	Mrs. J. Khoodoo	2nd October, 1969
10.	Bradley College Long Mountain.	Mr. M.M. Fakeer	2nd October, 1969
11.	Unity College Rose Belle.	Mr. P. Dussee	9th October, 1969

School	Principal	Date of Visit
12. Hamilton College Hollandais Street, Mahebourg.	Mr. A.S. Khodabusi	9th October, 1969
13. Willoughby Girls College Nyon Street, Mahebourg.	Mr. J.M. Bisasur	9th October, 1969
14. Merton College Pamplemousses.	Mr. M. Dusmohamed	22nd October, 1969
15. Darwin College Central Flacq.	Mr. H. Khadaroo	20th November, 1969
16. Trinity College Port Louis.	Mr. C. Obeegadoo	24th November, 1969
17. Presidency College Curepipe Road.	Mr. R. Rummun	25th November, 1969
18. Royal College Port Louis.	Mr. R. Murat	8th December, 1969
19. Loreto Convent Curepipe.	Rev. Mother Provincial	8th December, 1969

II. Visits to Other Educational Institutions

1. University of Mauritius	Dr. O. Wiehe Vice-Chancellor	7th October, 1969
	Professor A. MacDonald School of Agriculture	23rd October, 1969
	Mr. R. Lamy Registrar	
2. Visual-Aids Unit Trade Training Centre, Beau Bassin.	Mr. H.R. Mills Unesco Expert	1st October, 1969 28th October, 1969
3. Teachers' Training College Beau Bassin.	Mr. C. Cure Principal	23rd October, 1969
4. Audio-Visual Unit Ministry of Education, Rose Hill.	Mr. K. Ragoonaden	9th October, 1969 10th November, 1969
5. Youth Service Division Ministry of Education	Miss Priscilla Thomas Senior Youth Officer	20th November, 1969

(Mr. A. Pyneeandee, Youth Organiser, was absent overseas)

Attachment Two

ROYAL COLLEGE, CUREPIPE
SCHOOL CERTIFICATE 1968

Number of candidates	85	Percentage of passes	97.6
Passed with Grade I	46	Sat for 1 or 2 subjects	11
Passed with Grade II	28	Obtained Credit or better	7
Passed with Grade III	9	Qualified for English Scholarship	59
Awarded G.C.E.	1		
Failed	1		

SUBJECT ANALYSIS

Subject	Number of Candi-dates	Very Good 1 and 2	Credit 3 - 6	Pass 7 & 8	Fail 9	% of Credit or Better	% of Passes
English Language	85	7	69	8	1	89.4	98.8
English Literature	85	9	44	24	8	62.4	90.6
French	85	20	64	1	-	98.8	100.0
Mathematics	85	32	48	3	2	94.1	97.6
Additional Mathematics	54	2	40	7	5	77.8	90.7
Physics	78	8	39	18	13	60.3	83.3
Chemistry	80	12	57	8	3	86.3	96.3
Biology	65	3	47	9	6	76.9	90.7
Latin	7	5	2	-	-	100.0	100.0
Greek	5	4	1	-	-	100.0	100.0
History	21	-	6	8	7	28.6	66.7
Geography	10	1	6	2	1	70.0	90.0
French Literature	19	2	12	3	2	73.7	89.5

(Sgd.) J.B. Bathfield,
Rector.

19th March, 1969

ROYAL COLLEGE, CUREPIPE
H.S.C. RESULTS 1968

Number of candidates	94
Number of passes	60
Percentage of passes	63.8

Subjects at Principal Level

Subject	Number of Candidates	Pass in Grade					Pass at Subsidiary Level 0	Fail	% of Passes at Principal Level
		A	B	C	D	E			
Mathematics	70	14	13	9	8	8	7	11	74.3
Physics	65	9	8	14	9	10	13	2	76.9
Chemistry	75	5	12	5	9	20	15	9	68.0
Biology	20	-	-	1	1	6	9	3	40.0
English	17	2	3	1	2	6	3	-	82.4
French	16	10	2	2	1	-	1	-	93.8
History	10	-	-	2	1	2	4	1	50.0
Greek	1	1	-	-	-	-	-	-	100.0
Latin	7	1	2	1	-	2	1	-	85.7

Subjects at Subsidiary Level

Subject	Number of Candidates	Pass in Grade						Fail in Grade			% of Passes
		1	2	3	4	5	6	7	8	9	
General Paper	94	3	3	11	15	15	32	11	3	1	84.0
French Literature	39	4	1	5	3	2	7	5	5	7	56.4
Biology	32	-	-	-	-	3	8	6	10	5	34.4
Greek	4	-	1	1	-	1	1	-	-	-	100.0
Mathematics	8	-	-	5	1	-	2	-	-	-	100.0
Geography	5	-	-	-	-	1	3	-	-	1	80.0
Government	6	-	-	1	-	2	2	-	-	1	83.3

Note: One candidate who entered for Biology at Principal Level did not take all the papers set.

(Sgd.) J.B. Bathfield,
Rector.

5th March, 1969

Attachment Three

ISLAMIC CULTURAL COLLEGE PORT LOUIS
BIOLOGY SYLLABUS 1969

FORM I

1. Characteristics of living things. Differences between living things and non-living things.
2. Elementary treatment of a plant and animal cells exemplified by (a) Spirogyra, (b) Amoeba. Differences between them should be pointed out.
3. The external morphology of a named flowering plant, together with functions of its parts, i.e. roots, stem, buds, leaves, flowers and fruits.
4. The external morphology of a named fish, amphibian, reptile, bird and a mammal.
5. The structure of the following seeds - (a) bean, (b) sunflower, (c) castor oil, (d) maize.
6. The microscope as an important tool in the study of biology.

FORM II

1. A more detailed study of the flowering plant. Types of stems, roots and leaves, and their modifications. Storage organs. Differences between monocotyledonous and dicotyledonous plants.
2. The external morphology of (a) an earthworm, (b) an insect, e.g. a cockroach, (c) a named flower, e.g. Hibiscus, (d) a named fruit.
3. An elementary survey of the main processes taking place in the living organisms.
4. A more detailed study of seeds, including germination. Experiments to show the conditions necessary for germination.
5. An elementary classification of (a) the animal kingdom, (b) the plant kingdom.
6. Hydra : as an example of a simple multicellular organism; and should be compared with Amoeba, so as to show its greater complexity.

FORM III

1. Elementary classifications of fruits; dispersal of fruits and seeds.
2. The main structural features of the mammalian alimentary canal; outline of digestion.
3. An elementary survey of photosynthesis. Conditions necessary for the process to take place.
4. The structure of the mammalian heart; arteries and veins. An elementary study of the circulation of blood in a mammal.
5. Study of geotropism, phototropism and hydrotropism in plants.
6. The mammalian skeleton and its functions. The muscular system of the body (excluding histology).
7. The mammalian skin; its structure and function.
8. Characteristics and constituents of soil. Simple experiments on physical properties of soil. Determination of amount of air, water and humus. Comparison of capillarity and porosity of different samples of soil; nitrogen and carbon cycles.
9. Respiration; respiratory organs and mechanism of breathing in mammals.
10. A more detailed classification of (a) animal kingdom, (b) plant kingdom; chief characteristics of each phylum should be pointed out.

FORM IV

1. A more detailed study of the mammalian alimentary canal, and digestion; a comparative study of alimentary canals of vertebrates in relation to their diets.
2. Nutrition, proteins, carbohydrates and fats, mineral salts, vitamins. Importance of water; enzymes.
3. Simple treatment of anatomy of (a) stem, (b) root, (c) leaves, in relation to their physiological functions.
4. Mineral nutrition; details of experimental techniques should be omitted.
5. The nervous system; its general plan; structure of a nerve cell; reflex arcs; simple and conditioned reflexes.
6. Types of flowers and inflorescences: pollination and fertilisation; development of fruit and seed dispersal.
7. The structures and functions of (a) kidney, (b) liver, (c) skin, (d) blood.
8. Respiration: in green plants; seeds; micro-organisms and animals.

Attachment Four

PRESIDENCY COLLEGE
GENERAL INTERNAL EXAMINATIONS 1968 : FORM IV

BIOLOGY Time Allowed : 2 hours

Section A (Attempt *all* questions)

1. Define the following (a) respiration
   (b) photosynthesis
   (c) muscles
   (d) joint
   (e) vascular system
2. Make a large labelled diagram of a typical vertebra.
3. Name 5 external features only, present in mammals.
4. Make a large labelled drawing of an amoeba.
5. List the components of blood.
6. Name two organs found just beneath the diaphragm.

Section B (Attempt any 4 questions)

7. Make a well labelled diagram of the skin. Give its functions.
8. Draw and describe the heart, mentioning the blood vessels connected to it and the importance of each.
9. Make a large labelled drawing only of the kidney. Give its functions.
10. Draw and label any flower you have studied. How pollination occurs in it? Give the changes occuring in it after fertilisation.
11. Draw and describe the eye. What do you understand by accommodation?
12. What do you understand by a reflex action? Draw and describe a reflex arc.
13. Make a large, labelled diagram of the alimentary canal of a rabbit. How does it differ from that of man?

APPENDIX D

A REPORT TO THE MINISTRY OF EDUCATION AND CULTURAL AFFAIRS ON THE STATUS OF ENVIRONMENTAL TEACHING IN SECONDARY SCHOOLS WITH RECOMMENDATIONS FOR IMPROVEMENT

by

G.R. Meyer, Unesco Consultant

SUMMARY

1. Environmental teaching is an important aspect of biology curricula. There is a world trend in school biology to emphasise the relationship between man and his environment and to focus attention on problems such as health, population, agriculture, conservation and pollution.
2. Before October 1969, biology teachers in Mauritius had had very little training in the techniques of field teaching or in the organisation of visits away from the school.
3. A successful training programme was undertaken from October to December 1969 and those teachers attending are now confident and skilled in the techniques of environmental teaching.
4. If the skills and attitudes of the teachers are to be further developed, then they must be assisted by professional biologists; by further programmes of training; by the production of publications on the natural history of Mauritius, and by sympathetic attitudes on the part of administrators and principals to the problems of lessons away from the school.

1. The Need for Environmental Teaching

There is a world trend in biology teaching to stress understanding of man's relationship with his environment. This means that pupils should appreciate the forces that would determine their immediate surroundings and which affect man directly. Problems of hygiene, agriculture, population, pollution or conservation therefore are considered in most of these programmes. This is the type of approach that has been adopted, for example, by the authors of the booklets produced by the Unesco Pilot Project for Biology Teaching in Africa.

A programme with this type of objective should stress as a teaching method, excursions and visits away from the school. An understanding of environment can only come from experiencing this environment personally.

In Mauritius, environmental teaching is vitally important if biology is to make a meaningful contribution to the development of the country and to the general education of Mauritians. Biology, if taught with an environmental and ecological emphasis, can bring understanding and hence solutions to such urgent problems as over-population, agricultural diversification, control of disease, conservation of natural resources and pollution.

2. Teachers Experience of Environmental Teaching in Mauritius

During the first meeting of the seminar group the thirty-five biology teachers attending were asked about their experience of field studies, organisation of visits, and general approach to environmental teaching.

One or two members of the group had conducted field excursions and visits to institutions, but the great majority had not attempted this type of work and had no knowledge of the special techniques or educational objectives of the environmental approach. After appropriate discussion and training programmes the teachers were anxious to learn about simple ecological methods, and techniques of organising institutional visits and to feature such activities in teaching programmes.

3. The Special Potential of Mauritius for Environmental Teaching

I arranged mainly during the first half of the programme, week-end tours of the country to locate sites suitable for field studies and for visits to various institutes. The following types of locations were visited:

I. Field Sites

freshwater creeks
lakes
swamps (freshwater and mangrove)
rocky seashore
sandy beach
volcanic craters
indigenous forests
introduced forests
conservation areas
botanical gardens

II. Agricultural Centres

- neglected and well arranged cane fields
- tea plantations
- sugar factory
- tea factory
- projects of the Young Farmer's Clubs

III. Biological Institutions

- Mauritius Institute (Natural History Museum)
- Mauritius Sugar Industry Research Institute
- School of Agriculture, University of Mauritius
- Department of Entomology, Ministry of Agriculture
- Mauritius Herbarium
- Research Laboratories of Candos Hospital
- Historical Museum, Mahebourg.

A short report on each of these tours and visits is presented as Attachment One.

See Attachment One

On the basis of this survey prototype sites for excursions and visits were located and surveyed for their teaching potential. A report on these prototype sites is presented as Attachment Two.

See Attachment Two

As a result of this survey of the Island for possible excursion sites, it became obvious that Mauritius is particularly well endowed with opportunities for out-of-doors teaching. There is a wide variety of locations suitable for lessons on many aspects of biology. In addition, because of the size of the Island, no location is very far from any school and costs and other problems of transport are minimal. The climate and the weather conditions for most of the year are very suitable for out-of-doors work. While there are a few health hazards (e.g. Schistosomiasis in some freshwater ponds), these dangers are not great and can be overcome by suitable precautions. My overall impression is that Mauritius, in spite of its small area, has opportunities well above average for field teaching. The ecological approach advocated by the Unesco Pilot Project for Biology Teaching in Africa should be very easy to introduce, and indeed could become a central theme in any new curriculum.

4. The Training Programme for Environmental Teaching

The absence of experience in teaching through excursions and visits away from the school was seen as a major barrier to curriculum reforms based on environmental teaching. A central objective of the seminars therefore, was defined as training in the techniques of out-of-door teaching, and teaching through visits and excursions.

The following training procedures were adopted:

(i) During the seminar series lectures were given on the objectives and techniques of field teaching.

(ii) Each member of the seminar was supplied, free-of-charge, with the following publications:

  a. *Field Work in Animal Biology* (Besly, M.A. and Meyer, G.R.), Sydney, Angus and Robertson, 2nd Edition 1966.
  b. *Science and Environment of Man* (Cull, R., McDonnell, K. and Meyer, G.R.), Brisbane, Jacaranda Press 1966.
  c. *Objective Tests in Science* (Cull, R., McDonnell, K. and Meyer, G.R.), Brisbane, Jacaranda Press 1967.
  d. Pamphlets on wild life issued by the Australian Museum Sydney.
  e. An issue of the *Australian Science Teachers' Journal* containing articles on field teaching.
  f. An issue of the *Journal of the Mauritius Association of Science Education* containing an article on biology teaching.

(iii) A number of reference books were made available on ecology and field teaching.

(iv) The teachers were taken on prototype excursions and visits. These were of three types:

- to natural ecological communities
  - freshwater stream (on 19th October)
  - seashore (on 30th November)
- to agricultural and forestry sites
  - introduced forests (on 26th October)
  - cane fields (on 16th November)
- to one institution
  - the Mauritius Institute (Natural History Museum) (on 4th November)

(v) Groups of pupils together with their teachers were taken on excursions to demonstrate to teachers organisation and teaching procedures in the field.

For example -

on 19th November : staff and senior pupils of St. Mary's College Rose Hill, Loreto Convent Curepipe and Queen Elizabeth College Rose Hill, were taken on excursions to the seashore.

on 22nd November : staff and senior pupils of Royal College Curepipe were given a day on freshwater biology.

(vi) Special notes were prepared for each excursion to illustrate the types of activities that could be undertaken and to describe field methods.

Associated with each excursion, laboratory work was undertaken to follow up points raised during the actual excursions and to analyse and record the results.

(vii) A special demonstration and practical programme was organised to show how pupils could undertake discovery type learning using the school garden. This teaching was given in the grounds of Queen Elizabeth College on 16th October, 1969.

5. Appraisal of Success of Training Programme

Teachers responded very enthusiastically to the field programme. All obtained excellent results and learned the simple skills involved very efficiently. They all agreed that they would now be able to make a major feature of field excursions and visits. They were surprised at how quickly and easily simple quantitative techniques could be used in the field to give a great deal of information and to provide opportunity for real discovery learning. This aspect of the seminars, was, therefore, an unqualified success.

6. Recommendations for the Future Development of Environmental Teaching in Mauritius

If the enthusiastic attitudes of teachers towards field excursions, work in the school garden and visits to institutions are to be maintained, help and encouragement should be given in a number of ways.

(i) The Consultancy Committee (*See Appendix I)* should be asked to help in the preparation of teaching notes and in devising field methods for studying new field sites.

(ii) The Consultancy Committee and others should be encouraged to produce publications on local fauna and flora, written in such a way that the information is of direct use to teachers. For example, biological keys are urgently required.

(iii) The Mauritius Institute should rapidly develop its education service to provide leadership in out-of-doors teaching.

(iv) In-service activities of teachers should be encouraged. These should provide programmes of field excursions and visits. *(See Appendix I).*

(v) Administrators and school principals should be asked to help with the organisation of excursions and visits. In particular, school time-tables should be designed so that they are flexible enough to allow for lessons away from the school during the school day. Every help and assistance should be provided for transport (perhaps with the help of parents). Schools should also obtain the simple and inexpensive equipment necessary for field studies.

(vi) A new curriculum for Mauritius should be devised which emphasises the Mauritian environment and the local animals and plants. Excursions and visits should be regarded as a normal teaching procedure in the development of this course of studies. *(See Appendix I).*

1.12.69

Attachments

1. Report on visits to field sites and biological institutions.
2. Prototype sites for field excursions.

Attachment One

REPORT ON VISITS TO FIELD SITES AND BIOLOGICAL INSTITUTIONS FOR THE PURPOSE OF ORGANISING EXCURSIONS AND VISITS BY BIOLOGY TEACHERS, OCTOBER TO NOVEMBER 1969

by

G.R. Meyer, Unesco Consultant

1. The Following Institutions were Visited

Date	Name and Address of Institution	Personnel Interviewed	Comments on Resources
5.10.69	Tea Factory Bois Cheri	Floor Manager	The various processes of preparing the leaf from harvest to finished product could be studied. The chemical and physical changes and their relationship to the quality of the final product would be an interesting project for senior pupils.
6.10.69	The Mauritius Institute	Mr. C. Michel Director	An excellent series of displays in public galleries on biology and natural history with a special emphasis on the biology of Mauritius. There is need here for an education service. *(See Appendix F)*.
7.10.69 13.10.69	School of Agriculture University of Mauritius Reduit	Mr. R. Lamy Registrar Professor A. MacDonald	The School of Agriculture has excellent laboratories, a good library and useful displays. Facilities of the School were generously offered by Professor MacDonald for work with biology teachers (7.10.69). On a general visit to the University (13.10.69) the Registrar promised full co-operation of the University for activities by biology teachers.

Date	Name and Address of Institution	Personnel Interviewed	Comments on Resources
23.10,69	Department of Entomology Ministry of Agriculture Reduit	Mr. A. Joomaye Entomologist	A comprehensive collection of insects with emphasis on economic entomology. A useful reference collection for teachers.
9.10.69	Sugar Factory Rose Belle S.E.	Mr. R. de Froberville Factory Manager	The various stages in the processing of sugar from cane to crystal provide excellent opportunities for biochemical and biophysical studies for senior pupils and simple studies in economic biology for those in junior classes.
22.10.69	Botanical Gardens Pamplemousses	Mr. B. Jugnarain Superintendent	While these gardens are mainly of exotic plants, they provide a first class resource for biology lessons. Mr. Jugnarain would be pleased to help with excursions and visits to the gardens and to the plant nursery.
24.10.69 14.11.69	Mauritius Sugar Industry Research Institute Reduit	Dr. C. Ricaud Plant Pathology Department	Excellent laboratories, library and display materials for studying the biology of sugar cane. Full co-operation offered by Dr. Ricaud who would welcome teachers visiting his department.
22.10.69	The Public Service Commission Government Building Forest Side	Mr. L.F. Edgerley, O.B.E. Chairman of Public Service Board and previously Conservator of Forests	Mr. Edgerley has an extensive knowledge of the native and introduced forests of Mauritius. He offered full co-operation in training teachers in field methods.

Date	Name and Address of Institution	Personnel Interviewed	Comments on Resources
9.10.69	Historical Museum Mahebourg		Historical relics. The Museum does display some old maps of marginal interest to biology teachers.
12.11.69 20.11.69	National Federation of Young Farmers Clubs, Phoenix	Mr. B. Curpen Manager	An excellent network of farming projects throughout the country. On 20.11.69 Mr. Curpen kindly escorted me to a number of agricultural sites organised by Young Farmers Clubs. These would be very useful resources for biology teachers. (Projects include fish farming, oyster culture, pig, goat, rabbit and chicken farming, vegetable growing).
18.11.69	Central Laboratory Orthopaedic Hospital, Candos	Mr. C.H. Courtois Government Entomologist. Mrs. F. Gebert Miss E. Furlong (Assistants)	A well equipped laboratory dealing with insects as disease vectors and also with certain other parasitic organisms. Excellent displays. Mr. Courtois would be delighted to help teachers in any way possible.
21.11.69	The Mauritius Herbarium C/- M.S.I.R.I. Reduit	Dr. R.E. Vaughan Director. Dr. O. Wiehe Vice-Chancellor University of Mauritius	The Mauritius Herbarium has a comprehensive collection of plants of Mauritius. There are also excellent displays and maps. Dr. Vaughan and Dr. Wiehe have published extensively on Mauritius botany. Both offered full co-operation.

2. The Following Journeys were Undertaken to Locate Sites for Field Excursions

Date	Route	Sites Located
5.10.69	Curepipe - Petrin - Bois Cheri - Souillac - Morne Plage - Chamarel - Black River - Vacoas - Curepipe	1. Plant succession in volcanic crater "Trou aux Cerfs" at Curepipe. 2. Introduced forests of pine and eucalyptus at Henrietta. 3. Freshwater stream near Grand Bassin. 4. Rocky seashore at Bel Ombre.
12.10.69	Curepipe - Nouvelle France - Rose Belle - Mahebourg - Blue Bay - Le Bouchon - Curepipe	1. Cane fields and tea plantations at various sites Curepipe to Mahebourg. 2. Rocky and sandy shores at Blue Bay. 3. Rocky shore at Le Bouchon. 4. Mangrove estuary at Pointe D'Esny.
15.10.69	Curepipe - Quartier Militaire - Riviere Seche - Trou d'Eau Douce - Belle Mare - Roches Noires - Pamplemousses - Curepipe	1. Rocky and sandy shores at Trou d'Eau Douce. 2. Plant succession in lake near Trou d'Eau Douce.
24.10.69	Curepipe - Flic en Flac - Curepipe	1. Excellent location for plant zonation on beach sand. 2. Comparison between basalt and limestone rock platforms.
25.10.69	Curepipe - Flacq - Roches Noires - Cap Malheureux - Trou aux Biches - Port Louis - Curepipe	1. Excellent zonation of organisms on rocky shore at Roches Noires. 2. Freshwater stream at Flacq. 3. Sandy and rocky shores at Cap Malheureux.
6.11.69	Curepipe - Gunner's Coin Island - Curepipe	While the Island has a most interesting biology it is too dangerous for field excursions.

Date	Route	Sites Located
23.11.69	Curepipe - Ile aux Aigrettes - Curepipe	This Island has remains of the original littoral flora of Mauritius and as such would be a valuable study for teachers and pupils. Easy boat access. (Visit sponsored by Natural History Club of Mauritius).
27.11.69	Curepipe - Petrin - Curepipe	Survey of three conservation areas near Curepipe with Dr. R.E. Vaughn (Mauritius Herbarium), Perrier, Petrin and Macabe. Last two ideal for schools. First suitable for research studies only.

1.12.69

Attachment Two

A REPORT ON PROTOTYPE LOCATIONS FOR FIELD EXCURSIONS IN MAURITIUS

by

G.R. Meyer, Unesco Consultant

The following sites are particularly suitable for field studies of natural ecological communities. One site for each type of environmental problem has been chosen. Teachers should regard these sites as models for the problems specified. If there are similar locations nearer to particular schools, then provided precautions are taken in regard to safety and health, the nearer locations should be substituted.

1. Freshwater Stream

An ideal site is the creek cut by the road between Petrin and Grand Bassin. It has contrasted areas of still pools, waterfalls and slow currents and contains a good variety of plant and animal life. It is quite uncontaminated and relatively near to Curepipe.

2. Mangrove Swamp

An excellent swamp occurs at Pointe d'Esny on the road between Mahebourg and Blue Bay. It has an excellent mangrove community conveniently located near transport and near the sea.

3. Introduced Forests

Good stands of pine and eucalyptus stand next to each other at Perrier conservation nature reserve. The forests have good profiles and excellent leaf litter communities. They are near transport and are easily accessible.

4. Zonation of Organisms on Rocky Shores

The littoral community is somewhat sparse in Mauritius but there is a good zonation of animals on the rocky shore at Pointe de Roches Noires.

5. Plant Zonation on Sandy Beach

There is a clear cut zonation of plants colonising the beach sand north of the main beach at Flic en Flac. This zonation can be easily studied as it has only about eight zone indications. It is close to transport.

6. Native Littoral Forests

Ile aux Aigrettes is an exceptional location for this study. It is, however, both a conservation reserve and private property so permission must be obtained for excursions. Comparisons can be made with the vegetation of the coastline near Mahebourg.

7. A Conservation Nature Reserve

An ideal reserve for study by schools is the 130 acre reserve at Petrin. This is an upland forested area with native vegetation and gives an excellent opportunity for studies of the relationships between native and exotic species.

8. Plant Zonation in a Volcanic Crater

The old crater of Trou aux Cerfs near Curepipe has a clear cut zonation from bottom to rim and would be an ideal school study.

9. Upland Vegetation

The gradual slopes of hills such as Mt. du Rempart and Mt. St. Pierre, would be ideal for studying changes in plant distribution with altitude.

1.12.69

APPENDIX E

A Report, with Recommendations, to the Ministry of
Education and Cultural Affairs

on the

ROLE OF SCHOOL RADIO BROADCASTS AND EDUCATIONAL TELEVISION IN THE DEVELOPMENT OF SCIENCE TEACHING IN MAURITIUS

by

G.R. Meyer, Unesco Consultant

Summary

1. The terms of reference from Unesco were to "investigate possibilities for producing suitable educational broadcasting and television programmes for biology teachers, science teaching in general, and possibly also for the public at large, particularly for adults in rural areas".
2. Production and broadcasting of educational programmes were surveyed in some detail during the period 30th September to 31st October, 1969. This aspect was undertaken co-operatively with Mr. George Grimmett of CETO.
3. Reactions of science teachers to the broadcasts and television programmes were studied. On the whole biology teachers had made little if any use of school radio broadcasts. They were very satisfied on the whole with the current series of television broadcasts revising topics for the School Certificate. All however, expressed the need for greater structure in the sequencing of topics and in the integration of the broadcasts into school lessons.

4. Facilities for producing radio and television programmes were surveyed, co-operatively with Mr. Grimmett, at the Ministry of Education Audio-Visual Unit, at the Mauritius Broadcasting Corporation and in schools. At present, production facilities are reasonably adequate for school radio, but a great deal of development is required for the continued growth of an effective television service for schools and for adults in rural areas.
5. A scheme for educating rural adults by radio and television was considered. Surveys were made of the activities of the Youth Services

Division of the Ministry of Education and Young Farmers Clubs to assess whether these activities could be the centre of programmes of adult education.

6. The following recommendations are made:
   - i) School broadcasts should continue and be extended. They should be administered by the present Audio-Visual Unit of the Ministry. Programmes should be directed more specially to topics of the school syllabuses and should be accompanied by teaching notes and advisory guides.
   - ii) Television broadcasts should continue but need a great deal more support than at present. Effective educational television requires a full-time team of television and audio-visual experts working with subject specialists and educationalists.
   - iii) In order to achieve a strong E.T.V. service some institutional structure should be considered. Ultimately such a service could be the responsibility of a central educational institute such as a School or Institute at the University. In the meantime, a strong separate section of the Ministry under the direction of a Senior Ministry Official could administer this service.
   - iv) Broadcasts could perhaps be made during school time with television monitors placed in key centres. This would enable close integration of the programmes into school lessons.
   - v) The purchase of a video-tape recorder or the filming of day-time programmes would allow re-broadcasts in the evenings for adult audiences, for in-service work with teachers and for pupils unable to watch during the day.
   - vi) Systematic radio and television programmes for the education of rural adults should be considered for the future. They could be tied in to the present activities of youth clubs and young farmers clubs.

Terms of Reference from Unesco

As part of the duties specified in the contract with Unesco I was, "in close collaboration with the Mauritius Ministry of Education" to -

"investigate possibilities for producing suitable educational broadcasting and television programmes for biology teachers, science teaching in general, and possibly also for the public at large, particularly for adults in rural areas".

At the time of arrival in Mauritius on the 28th September, 1969, programmes of school radio broadcasts and educational television were in operation. This section of the contract was therefore interpreted as an opportunity to study the educational effectiveness of the current series of programmes, limiting the study to science subjects. An opportunity was also taken to make certain recommendations for future development of broadcasting and television for science teaching and for adults in rural areas.

Co-operation with the Centre for Educational Television Overseas (CETO)

On receipt of the terms of reference quoted above I wrote to Mr. T. Singleton, the Director of CETO in London in July 1969 for information and advice on educational television in Mauritius, and very useful general information was sent in reply. Following this initial contact, Mr. A.B. Edington, CETO's Associate Director of Information and Research, visited Paris and had talks on educational television in Mauritius with Mrs. Anne Hunwald of the Science Teaching Division. We were delighted to learn that CETO would be sending a specialist to Mauritius to help with educational television at much the same time as my own period of consultancy. On the 19th August, 1969 (reference SCT/6145/27/61), Mrs. Hunwald wrote to Mr. Edington offering co-operation between CETO and Unesco.

On arrival in Mauritius I was pleased to find that the CETO specialist, Mr. George Grimmett, had arrived a month earlier, and would be in Mauritius until the 18th November.

His terms of reference were to assist the Ministry of Education and Cultural Affairs in the introduction of a revision series of educational television programmes for schools from the 1st September to the 31st October, 1969. He was also to advise on the establishment and further development of a permanent unit to produce educational programmes on television.

I would like at this point, to gratefully acknowledge the valuable help given to the Unesco project by CETO through Mr. Grimmett. Mr. Grimmett and I worked in the closest co-operation and had many detailed and helpful discussions. In addition, on the 24th October Mr. Grimmett gave a seminar to the biology teachers on using E.T.V. in biology lessons and organised a visit for these teachers to the Mauritius Broadcasting Corporation's Studios to study the production and broadcast of a biology lesson. He also made available to me, for personal analysis, video-recordings of specific programmes and arranged contacts with people in the Audio-Visual Unit of the Ministry of Education. Mr. Grimmett's close co-operation made this aspect of the Unesco project much more effective and I am very grateful to him.

I should comment here, that Mr. Grimmett's personal enthusiasm and very great knowledge and ability in the field of educational television was evident to all who worked with him. The modest success of the first series of broadcasts, was due in no small measure, to his intensive work with studio and audio-visual technicians and above all, with the teachers giving the actual broadcasts.

Present Position of Educational Television and Broadcasting in Mauritius

Radio programmes for schools were begun in the early fifties by tutors at the Teacher Training College. When the Ministry of Education and Cultural Affairs established an Audio-Visual Unit in Rose Hill, the responsibility for educational broadcasting was taken over by that unit. At first teachers were paid to write scripts but more recently programmes are prepared without fee.

Broadcasts are provided for both primary and secondary schools. For primary, about 40% are BBC transcriptions and 60% locally produced. Of the latter, a proportion such as the "Things We Use" series are tapes of earlier productions, and need some revision to bring them up-to-date. For secondary schools about 65% of the broadcasts are BBC transcriptions and about 35% locally produced. Almost all subjects of the curriculum are involved. Programmes are given on each school day for about 15 minutes in the late morning.

Television in Mauritius began in February 1965 and some educational broadcasts were begun in 1966. Enrichment programmes aimed for general adult audiences and secondary school pupils were organised by the Audio-Visual Unit of the Ministry. Broadcasts were on Tuesdays and Thursdays from 5.00 to 5.30 p.m., and from 6.00 to 6.15 p.m. on school days. Almost all subjects were involved including science, but there was some emphasis on literature, history and geography.

These educational broadcasts continued until the end of August 1969 when they were replaced by a systematic series of television programmes providing revision for the School Certificate Examinations. Programmes in this series at first were from 6.30 to 7.30 p.m. on each school day and later from 6.00 to 7.00 p.m. Secondary teachers gave their services free-of-charge. Each evening two half-hour programmes were broadcast, each covering an area of one of the specified examination syllabuses. The series ended on the 31st October, 1969.

~~The programmes in this series are listed in Attachment One~~. It was for this series that Mr. Grimmett of CETO gave his help and advice.

At the present time no systematic use is being made of radio or television in adult education, by the Youth Service Division of the Ministry of Education or by the National Federation of Young Farmers Clubs. ~~See Attachment One~~

Method of Assessment of Radio and Television Programmes

In order to make some assessment of the effectiveness of the radio and television educational programmes I undertook the following activities:

1. Discussed the effectiveness of both types of programmes with a group of secondary school biology teachers meeting at Queen Elizabeth College on Tuesday, 18th November.
2. Visited a primary school, the Mont Roches Government School, Beau Bassin (on 2nd October, 1969) and discussed the radio broadcasts with staff.
3. Had several visits to the Audio-Visual Unit of the Ministry of Education for observation of facilities and for discussions with staff.
4. Had extensive discussions with Mr. George Grimmett of CETO from the 28th September through until the 18th November.

5. Read preliminary reports by Mr. George Grimmett *(See Attachments One and Two)*.
6. Visited, with biology teachers, the television studios of the Mauritius Broadcasting Corporation to observe facilities and to watch a broadcast (on the 24th October, 1969).
7. Observed and analysed selected video-tapes of educational broadcasts in the current revision series made available by Mr. Grimmett.
8. Observed twelve television broadcasts, eight on science and four on non-science.

Appraisal of Radio Programmes

On the whole, secondary science teachers seem to have made little if any use of educational broadcasts. Most considered that the programmes were not closely related to the current syllabuses. Many also commented that it was difficult to organise school time-tables to gain maximum advantage of the broadcasts. Many broadcasts came during lunch time or at other unsuitable times. It seemed to most, however, that time-table problems could be overcome if the quality of the broadcasts warranted re-arrangement of the school day.

Reaction from primary schools was more favourable. Many teachers found the broadcasts very helpful, and while some commented that some programmes were unrelated to the course, most teachers interviewed said they were able to integrate the topics into their lesson sequences.

On the whole, education by radio is at present in need of considerable expansion, especially in secondary schools and for adults in rural areas.

Appraisal of Television Programmes (Revision Course September to October 1969)

The television series organised for the revision of the Cambridge School Certificate Examination seems to have been well received by teachers and pupils. Reaction was especially favourable in the fields of French and English literature, geometry, chemistry and biology.

There was a very good response to the idea of locally produced programmes directed to the specific needs of school courses. Teachers welcomed the Ministry's contribution to secondary education through television.

Many teachers expressed the view that the series would be more useful if broadcast during the day and so integrated in lesson sequences.

Some teachers commented that the programmes were too crowded with facts but it was generally appreciated that this was due to the function of the broadcasts as a revision series.

A number of comments was made about the sequence of topics. It was generally felt that within any one subject, there was insufficient over-all structure. The topics seemed too unrelated and there was little if any continuity from unit to unit.

Comments on the actual details of presentation were generally reasonably favourable. Some suggested that in certain cases insufficient use had been made of the possibilities of the visual element provided by television. Individual teachers were seen on the screen too much instead of graphics, films, experiments, specimens and other visual materials. This comment was particularly relevant in the case of the non-biological sciences. It was generally appreciated, however, that teachers were giving television lessons for the first time and on a part-time basis. Comments were made that standards would improve with training and experience; but could only be of satisfactory quality if special television teachers were appointed full-time.

It was disappointing, however, to find only few teachers making direct use of the broadcasts in their revision lessons. In the case of the thirty-five biology teachers attending the teaching seminars at Q.E.C. only two or three had given "introductory" and/or "follow-up" lessons at school; or had ever referred to the broadcasts in any way during the school day. This highlights the urgency of having the broadcasts integrated very closely into the daily teaching programmes.

During visits to schools I made the point of questioning pupils on aspects of the programmes of the previous evening. Very few (less than 10%) had watched the programmes concerned, and of these only a small number seemed to have gained very much help from the lessons. The difficulty appeared to be lack of direction from the classroom teachers. Because television is regarded by most people as a medium for entertainment, very special attention has to be given by teachers to educational programmes otherwise they will be ineffective. Students must be alerted to watch for certain things and to "inter-act" with the broadcast as much as possible. They should certainly discuss the programmes with teachers as soon as possible after the broadcasts.

It was generally recognised that in the future, when television is used not for revision but for general lessons, detailed lesson notes and instructions for teachers and pupils should be distributed to all schools.

There was some evidence that the general public were most appreciative of the series of broadcasts as a measure of government interest in the education of young people. There was evidence, too, that this good-will was being lost to some extent towards the end of the series. This seemed to be because the subject matter was largely incomprehensible to less well educated people not following school courses and because it cut into television entertainment at a popular viewing time in the early evening. This "interference" in television as entertainment seemed to be tolerated only so long as the general public was convinced that the broadcasts were directly benefiting the young people at school. This imposes a very great strain on the producers and teachers who must maintain consistently high standards if the broadcasts are to continue to be accepted by the community at large.

Decline in interest in the series was also evident amongst pupils but this could have been due to a number of factors, not the least of which may have been the need to intensify formal study as the date of the examination approached. Certainly those pupils who watched the programmes in the first half of the series were very interested, even if the information gained was rather limited.

One final point should be made. Some perceptive teachers commented on the possible roles of television in the development and evaluation of new curricula and in the in-service training of teachers. It was generally felt that the 1969 revision series was a modest and moderately successful beginning and that the full potential of E.T.V. had still to be explored.

Appraisal of Production Facilities for Educational Broadcasts and Television

Visits to schools; to the Mauritius Broadcasting Corporation and to the Audio-Visual Unit of the Ministry of Education were made to study present resources for educational broadcasts and E.T.V. In addition, biology teachers giving television lessons in the current revision series were interviewed about their programmes. There were also extensive discussions with Mr. George Grimmett on the production of educational programmes.

Facilities for the production of educational broadcasts at present are reasonably adequate. The Audio-Visual Unit of the Ministry of Education has a staff well experienced in this field and there are adequate technical resources. The main deficiency is in the development of scripts. At present teachers are not given fees for radio scripts and this has made it difficult to obtain good new local material. Another deficiency is in the lack of a tape duplicating service which would enable broadcasts to be supplemented by a lending service of tape recordings. Cassette tape recorders and players are now relatively inexpensive and fairly common in homes. They could be borrowed and used by schools.

Facilities for educational television are less satisfactory. Technical facilities at the M.B.C. for actual broadcasting are reasonable, especially if E.T.V. programmes are limited to mornings. At present M.B.C. does not broadcast before the evening and full studio resources could be made available from 8 a.m. to say 11.30 a.m. each day for rehearsal and broadcast of E.T.V. The main deficiency is the lack of a video-tape recorder. This limits the evaluation and development of programmes and of courses, prevents storage and rebroadcasting of expensive and highly produced programmes.

At present the Ministry's Audio-Visual Unit cannot provide adequate support for E.T.V. There are insufficient graphic artists, photographers or sound engineers to provide necessary resources for full-scale production. More seriously, there are, apart from the Director, no qualified educationalists or subject experts to control and monitor the quality of the materials produced. The present buildings of the Audio-Visual Unit are inadequate as a centre for E.T.V. production.

The Special Needs of Young Adults in Rural Areas

By visits to the Young Farmers Organisation at Phoenix and after a review of reports on the Youth Services Division of the Ministry of Education, it was clear that the work of these services could be enormously enhanced by specific programmes of rural education, on both radio and television.

For effective adult education through radio and television in rural areas, some organisational structure is required to make the programme effective. Such a structure is provided by the Youth Clubs and the Young Farmers Clubs. Each service has clubs and meeting places in most towns in Mauritius. Interest in the activities of the clubs is high. Both types of clubs have a practical orientation ideal for adult education. Aspects of health; agriculture; literacy; conservation and other vital issues of the nation, could be developed in a series of programmes specifically designed for the young adult members of these clubs.

I was particularly impressed by the enthusiasm and endeavour of the young farmers when taken on a tour of inspection of field projects by Mr. B. Curpen on Thursday, 20th November. We visited vegetable projects near Port Louis and oyster farming, rabbit breeding and pig raising projects in the north. These projects would have clearly been made more effective if specific training programmes could have been provided on radio and television.

The importance of radio and television in campaigns of health education, literacy and family planning is self evident. The use of E.T.V. in particular in these fields remains an important development for the future.

Recommendations

1. School Radio Broadcasts

School broadcasts should continue and be extended, in both primary and secondary education.

The facilities of the present Audio-Visual Unit of the Ministry of Education should be strengthened by the employment of full-time educational writers and by being given sufficient funds to offer moderate fees to teachers for scripts.

The service would be tremendously more effective if facilities could be made available for the production, mass duplication and distribution of cassette tapes. This would allow schools to replay and analyze programmes at their convenience. This type of service is now feasible with the spread of inexpensive cassette tape players in the community.

Programmes need to be more specifically developed for local courses and detailed lesson notes produced giving advice on the integration of the programmes into lesson sequences. As well as advisory notes for teachers, specific lesson notes with projects and questions should be provided for pupils.

2. School Television Programmes

Television programmes should continue for secondary schools but require a great deal more support than at present. The following specific recommendations are made.

i. Production facilities must be expanded on the technical side. The present resources of the Audio-Visual Unit of the Ministry are inadequate and a separate organisation should be established for E.T.V. An ideal location for such a unit would be an Institute (Development Unit) of Education at the University.

ii. Institutional structure is vital because of the need to bring together a full-time team of educationalists and subject specialists working in close co-operation with technical experts in television and audio-visual education. In the absence of an Institute of Education, a strong separate section of the Ministry under the direction of a Senior Ministry Official could perhaps administer E.T.V.

iii. Broadcasts should be made during the school day to enable close integration of the lessons into the teaching programme. Purchase of a video-tape recorder would enable re-broadcasts in the evenings to wider audiences. Detailed teaching notes for both teacher and pupil should be produced by the E.T.V. service.

iv. The purchase of video-tape recorders would also improve production enabling critical analysis of programmes in development.

v. A strong E.T.V. unit linked to an Institute of Education could be used for teacher training; for the trialling of new materials and courses for specific but scattered groups, and for the evaluation of new courses.

vi. Teachers giving lessons by television should be full-time television experts trained and skilled in the special techniques involved. Again, this points to the need for a central educational institution providing the necessary resources for these television teachers.

3. Education of Young Adults in Rural Areas

i. At present a number of international agencies are active in Mauritius in programmes of rural education. In addition, there are various bilateral programmes, for example an interview on the 25th November with Mr. O.H. Laster and Mr. D. Fritz of the United States Peace Corp indicated that that agency would be sending 30 Peace Corp workers to Mauritius in 1970, about 20 of them to work in adult education and agricultural extension in rural areas. An interview at the head office of the National Federation of Young Farmers Clubs at Phoenix with Mr. Uzi Raveh of Israel gave information on an agricultural extension programme organised with aid from Israel.

Such agencies would be greatly assisted in their work if suitable training programmes could be provided on television and radio. A central agency would be required to co-ordinate such programmes and again it seems that an E.T.V. unit at a central Institute of Education would be most appropriate.

ii. The system of youth clubs and the National Federation of Young Farmers Clubs would be natural focal points for training programmes and discussion groups centred on E.T.V. and radio. Appropriate training notes and instructions could be issued from the co-ordinating agency so that most effective use would be made of the programmes.

Conclusion

Radio and television have important roles in school education, in the training of teachers and in the development and evaluation of new courses of study. They are significant agencies in adult education and of special importance in the education of young adults in rural areas.

Radio and television can be developed from the present resources in Mauritius provided these resources are strengthened and expanded. Radio broadcasts may perhaps be best organised through the present Audio-Visual Unit of the Ministry of Education. Television requires more elaborate resources and the creation of a separate unit, perhaps linked to an Institute of Education, is recommended.

27.11.69

Attachments

1. "Thoughts on E.T.V. in Mauritius : A Basis for Discussion" by G. Grimmett of CETO
2. Report by Mr. G. Grimmett on "Meetings of Educationalists Concerned with the 1969 Third Term E.T.V. Pilot Project Held at Q.E.C. on 4th November and 10th November, 1969"

Attachment One

THOUGHTS ON E.T.V. IN MAURITIUS : A BASIS FOR DISCUSSION

by

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Centre for Educational Television Overseas, London

The present series of educational television programmes has now been under way for six weeks and shows that:-

1. There is a wealth of enthusiasm and talent amongst local teachers, who are to be congratulated on their efforts in this experiment.
2. At the same time, it must be recognised that this has not been done without cost. Teachers are often spending between ten and forty hours in the preparation of their half-hour programme. This has been done on top of a full teaching load and private tuition classes (which appear to be economically necessary). Some have made purchases out of their own pockets to enrich their programmes. All of which is most commendable and reflects great credit on their professional devotion. But it is not a firm base on which a long term and continuing E.T.V. operation can be established.
3. It is difficult to judge the educational effectiveness of these television programmes. It might, eventually, be possible to compare past examination results with the results from this present examination to see if there is any 'significant' variation. But such an exercise is more likely to be interesting than important. I consider it more useful to assess reaction to the present programmes. I find school children, who are within the target audience, appreciative of the efforts that have been made and keen to follow programmes in their own subject areas. These programmes have stimulated their interests and, possibly, helped to concentrate their attention on the need for systematic revision at an early stage. In the case of a few programmes, and particularly when enthusiastic classroom teachers have "followed up" next day, it is observed that children have learnt much. But the viewing audience is much wider and many younger children pay rapt attention to all programmes. A considerable number of adults follow selected programmes with great interest. Teachers, in particular, welcome the service and look

forward to its development.

4. However, there are many practical problems both in production and utilisation that need to be resolved before the full effectiveness of such a series can be realised. Generally, and wherever television is used as a serious educational tool, it has been found necessary to employ full-time teacher/producers. Their programme output is related to the degree of sophistication required, but in most developing situations two 20-minute programmes per week are normal. (20-minute programmes are preferred to half-hour programmes since the concentration curve of the average child tends to fall off rapidly after about 15 minutes. It is also easier to arrange for a 20-minute programme to be received within a 40-minute teaching period, giving the classroom teacher an opportunity first to prepare his class and subsequently to do basic "follow up" after the programme).

   Valiant efforts have been made by the staff of the Audio-Visual Centre to support producers by typing scripts and preparing captions. Their facilities are inadequate to continue to accept this kind of responsibility in addition to their normal functions. The staff have talent and enthusiasm which largely compensate for their lack of training and experience; but for any regular series of programmes support facilities in caption making, still photography, 8 and 16 mm cine photography and script typing must be included in the plans.

5. The conditions under which viewers receive the programme in Social Welfare halls leave much to be desired. There are frequent distractions, apart from the absence of a person who can help serious students with any problems raised by the programme. Generally, E.T.V. teaching at school level only begins to be effective when it is carefully integrated into the classroom teaching programme. In other words, the classroom teacher must be master of the situation: he must be trained to use the television programmes. He must prepare his class for the programmes and "follow up" with his class afterwards. The television thus becomes one element in an educational system. It can help in many ways but its effectiveness depends upon the effort put into production utilisation.

6. The present high level of support for the E.T.V. programmes, from the general public, is more a measure of their recognition of the importance of anything which helps towards the achievement of a Cambridge Certificate, than of the intrinsic value of the programme themselves. Individual programmes, of course, are acclaimed. But many are recognised as being "just a beginning". And there are already many indications that the novelty of educational programmes is wearing thin, although it will carry us through to the end of the present series. If public support is to continue it is important that many changes be made at this time. Thus it is necessary to consider factors relating to future educational television developments.

TARGETS

Television is an extremely flexible tool which can be used in a variety of situations, but like any tool it needs to be skilfully handled to perform a given task. Thus it is necessary to consider exactly which tasks television might tackle in helping the "educational" system in Mauritius. From many conversations, it appears that targets for an E.T.V. service sight include:

(a) In School Education

Primary Level	Support for English language teaching, Mathematics (especially new approaches)
Secondary Level	Direct teaching support in English language, English literature, Mathematics, Chemistry, Biology, French literature, Physics
	Leadership and guidance in curriculum reform projects, particularly in mathematics and biology.
	Enrichment of a broad and general nature

University Level With moral development it is to be expected that television will prove to be as valuable in Mauritius as in many other universities.

(b) Out of School Education Support for

Correspondence extension courses
Functional literacy projects
Agricultural extension work and Young Farmers' Clubs
Family planning campaign
Health and welfare projects

This list is, clearly, by no means comprehensive, yet it shows immediate areas where a significant and needed impetus could be given.

GENERAL APPROACHES

These have been fully described by my colleague, Alan Nicholsen, in a paper which he submitted to the Government of Mauritius in April 1966. Very briefly, and from his wide experience of television, he underlines the necessity of careful forethought and planning if the effectiveness of the operation is to justify the costs of execution.

TECHNICAL FACILITIES

The M.B.C. have indicated that they can make a studio available for the E.T.V. services during the mornings. If this facility is obtained from 8 o'clock until mid-day, it should be possible to broadcast two live programmes each day (rehearse 8 to 9.30 a.m., transmit 9.30 to 10, rehearse 10 to 11.30, transmit 11.30 to 12). Studio facilities will not be available in the afternoon as this period will generally be required to set and light evening live shows and to maintain studio equipment. However, it might be possible to arrange limited use of the technical and transmission facilities between, say, 2 and 3.30 p.m. for regular broadcasts of enrichment films, many of which are available on free loan from Embassy sources, cleared for television and valuable in a broad educational sense.

Clearly, enormous benefit would be derived if a series of video tapes of all programmes could be stored. Apart from making it possible to re-broadcast programmes two or even three times each week during the 'rehearsal' periods (which would help headmasters in arranging school time-tables), this would also enable successful programme series to be stored for transmission in future years allowing production staff to tackle other subjects. However, this involves substantial capital investment in video-tapes of £100 sterling per one hour of recording and about £37,000 for a broadcast standard video-tape recorder and standby unit (figures are approximate).

As already mentioned, inadequate support services exist and an E.T.V. production unit will require graphic artists to produce captions, still and cine photographers and a sound recording engineer for special effects.

ADMINISTRATIVE STRUCTURE

If the immediate target of support in the fourth and fifth year at secondary level in English, mathematics and science and in the senior years of primary level in English language is accepted, and if the aim is to produce two live programmes on each school day - i.e. ten live programmes per week - it will be necessary to have a staff of six teacher/producers (one specifically responsible for liaison, viewer research, publications, etc.). Each programme will have a potential target audience of about 10,000 children (in practice the actual audience will probably be far larger). This figure underlines the need for the most careful preparation of programmes since one property of television is to give great authority to the television teacher. It thus becomes necessary to appoint the best teachers the Island can produce for this exercise, and special care must be given to their selection and training. An important by-product of their work will be, by their example, to raise standards of secondary teaching. It is understood that a Department of Education will shortly be established at the University with a prime responsibility in the field of secondary teacher training. This coincidence of function is one of the many arguments in support of placing the E.T.V. unit, administratively, under this Department of Education when it comes into being. This will have the additional advantage of keeping the unit in close touch with curriculum reform developments and daily contact with the Academic staff of the University. The exchange of ideas which this association will produce should lead to an enrichment of the programme contents and eventually towards helping some of the social and economic needs of the Island, as well as the rather more limited requirements of the Cambridge examiners.

It is suggested that one of the teacher/producers be appointed head of the E.T.V. unit. He would be the outstanding producer/Senior Education Officer, but with a lessened production load. The limited administrative requirements of the unit would be his concern. Together with the liaison officer he would be responsible for co-ordinating activities between the classroom and the producers, particularly by arranging regular seminars for teachers during the holidays to keep them informed of future programme contents and to help develop the techniques whereby they integrate television lessons into their teaching. The production of support material (teachers' notes, pupils' notes) would also be his ultimate responsibility. In making this suggestion I consider it likely that the British Council, if approached, might assist with a specialist English language officer to help with programmes in this special area. Thus an output of ten live programmes a week could be maintained through the school term.

PREMISES AND EQUIPMENT

If this suggestion of association with the University is acceptable, it would seem necessary to act with speed to see that the building now being constructed for the Education Department is made sufficiently large to accommodate an E.T.V. unit. This would mean an extension to existing plans (and the allocation of additional funds). The additional building should contain office space for five producers, one liaison officer and one head of section, also space for graphic production, still photography and cine film editing (cine film processing could be carried out at the M.B.C. studios by a suitable arrangement since quantities would not be large). It would also be valuable to have a room large enough to 'dry run' programmes (that is, rehearsal prior to studio rehearsal) which would also serve for seminars.

FINANCES

The recurrent expenditure involved would be the salaries of six teachers who should be paid an additional allowance to compensate them for loss of earnings through private tuition. For obvious reasons, it is important that the rule of 'no outside work', which appears to be ignored as far as the majority of teachers is concerned, be most strictly enforced with television teachers.

Additional recurrent expenditure would be required for two production assistant/secretaries (initially, two typists with shorthand), graphics personnel (two artists who would produce captions) and one still photographer who would also help with model making and editing cine films. Transport and a driver would be needed for liaison work. Provision for stationery, materials, etc.

It has been suggested that considerable help with the capital expenditure would be forthcoming from foreign aid sources, providing it can be shown that the E.T.V. service is geared to the economic and social requirements of the Island as a whole and not just to the production of more 'School Certificates'. Initially, it is inevitable that the emphasis of the unit must be directed towards this narrow end since this is the field in which the public generally will expect assistance from the television. It is also the field in which the television teachers will be best qualified to develop production techniques. However, it will be remembered that in the list of potential targets for educational television there are many subjects in the adult education section which lend themselves to treatment and where significant changes of attitude might be made by skilled production in the future. Thus, with this as an eventual declared target for the unit (once a sufficient stock-pile of 'in school' programmes have been recorded), it would be worth sounding foreign aid sources for help with the capital finance needed for this development, briefly:

- transport for the liaison officer
- still camera and processing equipment
- 8 and 16 mm cine cameras (excluding cine film processor)
- film editors, 8 and 16 mm
- broadcast quality video-tape recorders and standby machine and supply of 50 tapes
- T.V. sets for all government primary schools (eventually an arrangement would have to be made for these schools to offer viewing centres for Young Farmers' Clubs, etc. in the evening)
- T.V. sets for all government secondary schools and, possibly all aided secondary schools
- extra cost of building on to the educational wing of the University to house the E.T.V. unit.

RELATIONSHIP BETWEEN THE E.T.V. UNIT AND THE M.B.C.

The educational television programmes should be produced through an educational partnership between the E.T.V. production unit and the M.B.C. The success of this partnership rests on the understanding that effective education is the over-riding objective and the ultimate responsibility of the E.T.V. unit (and hence the University), whilst the technical quality of the broadcast signal is the responsibility of the M.B.C. which is a commercial corporation relying heavily on advertising revenue but with an enormous public responsibility. Such a partnership has indeed developed in the case of the present operation; it is a most valuable asset.

DETERMINATION OF PRIORITIES AND GENERAL GUIDANCE

Since a major aim in establishing an E.T.V. unit will be to create an instrument which will ultimately be able to generate a favourable climate of opinion for and indeed actively reinforce government campaigns for social and economic development, it is clear that its overall control and guidance is a matter of the highest importance. It is certain that by placing the unit under the responsibility of the University it will have the necessary integrity and objectivity of purpose. However, it will be necessary for the Vice-Chancellor (as the ultimate authority) to have the guidance of an E.T.V. advisory council to help him determine priorities for the limited production facilities which will be at its disposal. It is suggested that such a council might be chaired by a representative of the Prime Minister's Office, that the secretary should be the head of the E.T.V. unit and the members should be:

1. The Chairman of the M.B.C.
2. The Permanent Secretary for Education
3. The Professor of Education (?)

THE AUDIO-VISUAL UNIT OF THE MINISTRY OF EDUCATION

The Audio-Visual unit has acted most successfully as midwife to the present series of E.T.V. programmes. All of its staff deserve to be congratulated. They have worked unstintingly. However, it will be noted that I do not recommend the development of an E.T.V. unit as an adjunct to the Audio-Visual Unit. Some of my reasons have been given in considering the E.T.V. unit, but it is equally important to consider the work of the Audio-Visual Unit itself. In my opinion, this unit has not been given a chance to serve the educational requirements of Mauritian schools as it should and could. For example, there is an enormous potential for educational radio, especially when backed by film strips and other visual material (radio-vision and tape-slide series, etc.). There is also an obvious need for a film strip and slide library and a 16 mm film library. I consider that nothing but good could come from healthy rivalry and professional co-operation between two separate units. However, deficiencies of staff (for example, whilst the unit is responsible for school radio programmes no member of its staff has received radio production training), facilities and equipment must be made good to enable the unit to operate from a base of full professional competence. But it is clearly beyond the scope of this present aide-memoire to consider this possibility in more than rudimentary outline.

GENERAL

It will be noted that I have tended to look at the present and the future and that careful thought must also be given to the bridge between the two. Great care must be given to the selection of staff who are going to carry the heavy responsibility of programme production. I would suggest that a series of teacher workshop sessions each in different subjects (such as mathematics, biology, physics, chemistry, English language and literature) be held during a school holiday when all graduate teachers of that subject interested in educational television be invited to attend a 3-day session, which would consist of general instruction outlining techniques of educational television production, intermingled with practical exercises designed to test the teacher's aptitude in a number of directions. From this it should be possible to assess the best candidates in each field (the appointments would, presumably, rest with the Civil Service Commission). Immediately, six should be chosen and consideration given to their attending a CETO production training course at the earliest possible opportunity. Similar arrangements should be made for the graphic artists. I would recommend that they all be trained in London since this would enable them to observe standards and practices in a more sophisticated broadcasting environment. I think this is important, especially after the present interim exercise in Mauritius when limited experience might lead to a complacent attitude. These teacher/producers should be allowed a period of one academic term following their training in which to plan and prepare a series of programmes for schools. Thus it could well be that their first production exercise might again be directed towards School Certificate revision in 1970, or the academic year commencing January 1971.

For the first year of production - and possibly longer - it would be useful for an E.T.V. adviser to help guide the service through its teething troubles.

If it should prove politically inexpedient to discontinue E.T.V. programmes for a year, it might offer valuable experience (aimed at the ultimate education of teachers in E.T.V. utilisation) to spend the interim year in an extension of the present system whereby selected teachers are invited to contribute one lesson on a given topic. However, this lesson should be broadcast, as indicated, in the morning and schools - especially the "mushroom colleges" - should be encouraged to buy T.V. sets and to use them in their teaching plans. Again, it would be desirable to guide this programme through with an E.T.V. adviser responsible for careful liaison with the teachers and an acceptable standard of studio production with staff largely untrained.

Possibly, temporary accommodation for the E.T.V. unit could be found in a residential house near the University.

9.10.69

Attachment Two

MEETINGS OF EDUCATIONALISTS CONCERNED WITH THE 1969 THIRD TERM E.T.V. PILOT PROJECT HELD AT Q.E.C. ON 4th NOVEMBER AND 10th NOVEMBER, 1969

by

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Centre for Educational Television Overseas, London

PURPOSE

To review and assess the series by considering the experiences of the teacher/producers and the reactions of the viewing audience, especially pupils and their school teachers.

SUMMARY OF VIEWS

It was realised that in this series difficulties of production had tended to obscure the problems of utilisation. Nevertheless, much valuable and practical experience had been gained and important lessons could be learnt. The main points raised are covered by the following notes:

A. PRODUCTION

1. The first difficulty arose through the lack of a precise definition of the job to be done. It was felt that "revision for School Certificate and Higher School Certificate" left teachers with an impossible dilemma. For example: how much did pupils in the viewing audience know? How adequately had they been taught? How quickly could one proceed with "revision"? To what extent was it necessary to "teach de novo", etc.
2. This led to an emphasis of the need for systematic planning of a series of programmes; to ensure that the whole followed a theme with ideas linked from one programme to the next. Planning should also involve advanced time-tabling and information so that teachers would know what aspects of their subjects were going to be dealt with, in what order, in what way and at what time. Teachers' Notes must be produced in advance and distributed to schools in good time. They should also outline suggestions for "follow-up" work. (Properly produced, they could also do much to remedy the unsatisfactory situation concerning "text books" - was the view of one teacher, which received support).

3. Generally it was felt that the role of E.T.V. should be to teach rather than to revise for the specific requirements of an impending examination.

4. Teachers emphasised that they found it an almost impossible load to produce programmes on top of their normal teaching duties. As the series progressed, they realised that the more interesting, and hence better programmes, only resulted from the most careful preparation. Indeed, it was a widespread and unchallenged view that this project had demonstrated that E.T.V. production was a full-time job and that even then there was a need for specialised assistance with caption making, etc. But the work did not finish with the writing of a script and the preparation of visual material. Very many felt that a carefully conceived programme had lost its impact because inadequate time had been available for rehearsal. It was stressed that not only must there be an opportunity to test visual material well in advance of the programme, but that it was desirable to rehearse under simulated conditions well before going to the studio, and that studio rehearsal time itself should be far more generous and the rehearsal more systematic and disciplined.

5. Especially when looking to the future, it was felt that great value would be derived from a video-tape recorder which could store the best programmes and re-play them on demand. It was felt that not only would this result in a saving of labour, but that it would act as an incentive to teachers to produce really first class material. Many felt it would have considerable use in evaluating trial programmes prior to transmission.

6. Time and again discussion returned to the need to form a full-time E.T.V. unit of selected teachers who should receive special training and who would be supported by trained graphic artists; and that this unit should produce programmes for transmission during school hours to be used by teachers in the classroom.

B. UTILISATION

1. The importance of the role of the classroom teacher was apparent to all who had tried to assess the impact of this present series. It was clear that where classroom teachers had made a deliberate

effort to discuss programmes with their pupils considerable educational value had been derived.

2. However, such an effort was exceptional. In spite of this it was evident, especially at the beginning of the series, that children were delighted by the programmes. As the series progressed, it was noted that interest generally had dropped and that the remaining audience had become far more selective in its viewing. If a programme was not lively and interesting, the attention of the audience was quickly lost. It was suggested that part of the reason was that the public had reached saturation point; but it was also clear that some children studying for the important Cambridge Examination felt that they could not waste time on an experience which was not likely to help with their examination orientated revision. Unquestionably some children had become bored. However, it was recognised that this was a complicated matter and that it was dangerous to draw conclusions from a rather superficial study of the problem. Other obvious factors were: the pressures of school teachers and private tutors which were particularly intense at this time of the year, and the attractions of outdoor sports during the light evenings.

3. This led back to the original point of the need to specify the purpose of the programme and to define the audience for which it was designed; also to consider pupil motivation. Again, it was stressed that real educational benefit would only be obtained if programmes were transmitted during school hours when masters could prepare the class and answer questions afterwards.

4. Some thought that the language used had made it difficult for children in country areas to understand the programmes. There was clearly a difference in reaction among pupils to different programmes and presenters. This seemed to indicate the need for specialised training of the T.V. teachers and also the care with which they must choose their material, gauge the level of their presentation and the pace of their delivery. Again, the importance of notes to accompany the programmes, for pupils as well as teachers, was apparent.

5. It was felt, on the whole, that educational television in

Mauritius could offer far more to the less privileged schools than to the 'A' schools. There were many reports from children in "mushroom colleges" of their delight in seeing for the first time apparatus actually used to perform experiments. Nevertheless, it was thought that in the 'A' schools, television had an important role to play in giving a lead to developments in new curricula especially, for example, in biology and mathematics.

6. It was interesting to note that many managers and principals of "mushroom colleges" had indicated that they would be willing to obtain television sets for their schools if good quality E.T.V. programmes were broadcast. This led to consideration of the number of T.V. sets which would be required in a school and the need to train teachers to use the transmissions to the best advantage.

7. Whilst the prime role of educational television was seen in supporting teaching in the classroom, it was realised that there were many students who had left school and were studying at home on their own. It was thought that teaching by television could help these people considerably. Again it was obvious that a suitable video-tape recorder would be of great importance since it would enable programmes broadcast during school hours to be re-transmitted later in the day for the benefit of more general audiences.

8. It was the conviction of all members that educational television has a very important role to play in Mauritius. However, it must be "rooted in the life of the school" otherwise the efforts and money invested would be wasted.

APPENDIX F

Proposal to the Ministry of Education and Cultural Affairs
on the
ESTABLISHMENT OF AN EDUCATION SERVICE AT THE MAURITIUS INSTITUTE, PORT LOUIS

I. SUMMARY

1. At present the Mauritius Institute has excellent resources for helping biology teachers in schools. It is, however, little used for this purpose.
2. It is recommended that an Education Service be established at the Mauritius Institute as soon as possible (possibly January 1970).
3. The education service could arrange for biology lessons in the museum and provide teaching materials and information for schools.
4. The service could greatly assist both teaching and curriculum development in science in primary, senior primary and secondary schools.
5. The service could begin modestly with the appointment of a graduate biology teacher as Education Officer. Such an officer would require very little in the way of specific resources.
6. There is evidence that such a service would be used extensively by teachers.
7. After the introduction of the education service it should be possible to attract international aid for its further development.

II. INTRODUCTION

At present biology is not widely taught in Mauritian secondary schools. There are two main reasons for this : lack of teachers trained in this subject and lack of resources in schools. In primary schools a new natural history course, mainly biological in content, is to be introduced in 1970, and will be taught to all pupils.

Biology has a double role in the curriculum. It provides essential background for careers in applied biology such as medicine, nursing, pharmacy, dentistry, agriculture or veterinary science.

At the same time it makes an important contribution to the general education of pupils of all ages. It directs attention to vital human problems such as health, hygiene, agriculture, population control, conservation, pollution and other aspects of man's relationships with his environment. It is therefore particularly important in the school curriculum of a developing country with a basically agricultural economy.

Because of the key role of biology in school courses as much encouragement as possible should be given to its development in Mauritian schools. Resources for teaching biology are at present unco-ordinated and some are little used. One such resource is the Mauritius Institute in Port Louis. This is a first-class natural history museum seldom used by schools. This paper makes proposals for the development of the educational role of the Institute.

III. THE PRESENT RESOURCES OF THE MAURITIUS INSTITUTE

The main resource for teachers of biology are the galleries of exhibits arranged and supervised by the professional staff. The staff is limited at present, to the Director, and some technical and administrative assistants. A Deputy Director is to be appointed in 1970.

The galleries of exhibits are excellent and could be the basis of valuable lessons in biology. There are four public galleries:

Gallery one : aspects of vertebrate biology, evolution, conservation and ecology.
Gallery two : fishes, reptiles, birds and other vertebrate groups of special relevance to Mauritius. Emphasis on ecology and conservation.
Gallery three : corals, crabs, molluscs and other invertebrates. Emphasis on marine biology. Some displays on geology and meteorology.
Gallery four : (not biology) A small collection of art, mainly French paintings.

Other resources include a reference collection of specimens for research and an excellent research library. The Institute publishes a journal on the zoology of Mauritius.

There is also a small research laboratory and a photographic unit with dark-room. Both these sections would be of great value to an education unit.

IV. *THE ROLE OF AN EDUCATION SERVICE*

Throughout the world there is increasing use being made of Natural History Museums for education. The first step in organising such an education service is always the appointment of an Education Officer - a graduate teacher of biology. He then gradually develops the types of activities listed below.

1. Conducts lessons for classes visiting the museum by appointment.
2. Helps teachers design lessons which they come to the museum to present.
3. Produces project sheets and lesson notes for various age groups on topics relevant to exhibits in the galleries.
4. Develops a special teaching collection of common specimens which can be handled by pupils visiting the museum for lessons.
5. Makes small boxed collections of specimens illustrating various topics (with teaching notes) to lend to schools.
6. Provides displays, specimens and other visual resources for programmes of educational television.
7. Helps curators organise displays suitable for the general public and for schools.
8. Writes or commissions pamphlets or booklets on the biology of individual animals and groups of animals of relevance to school courses, e.g. local corals, crabs, native birds, the Madagascar hedgehog or the mongoose.*
9. Writes or commissions pamphlets on the biology of local agricultural industries such as tea, sugar or jute.

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* The Mauritius Institute has already produced an excellent booklet on animal life in Mauritius. It is Claude Michel's NOTRE FAUNE, Alpha Printing, Port Louis, 1966, 121 pp.

10. Writes or commissions pamphlets on the animals and plants of selected regions of Mauritius, e.g. rocky seashore; estuary; freshwater; forest; grassland or coral reef.
11. Conducts field excursions for pupils to selected environments.
12. Organises and runs an after-school Natural History Club for school pupils.
13. Offers a general advisory and information service for biology teachers, and for radio and television broadcasts for schools.

Such a service has obvious *educational advantages*:-

I. Provides a central resource and service that, each year, influences thousands of children and therefore makes most efficient and economical use of one trained teacher.

II. Utilizes, for education, a resource which represents a large capital investment. Without such a service the capital invested provides little return to the educational system of the country.

III. Co-ordinates and develops previously scattered and seldom used resources for the teaching of biology.

IV. Makes it possible for teachers to use local materials, specimens and examples in biology lessons.

V. Makes easier the task of planning new curricula with appropriate local emphasis and utilising local resources.

VI. Provides resources for educational television programmes on biological topics.

VII. Helps schools with poorer facilities by providing a central resource of displays and specimens (e.g. loan collections).

VIII. Gives help to inadequately trained biology teachers in need of advice and information.

IX. Strengthens respect for and understanding of biology throughout the community at large.

X. Revitalises the museum itself; increasing its status and usefulness in the eyes of the community and so increasing its efficiency as an information and research centre.

A museum with an educational service has a significant role to play in secondary, primary and senior primary schools.

Secondary Schools : Many central concepts of secondary school biology such as diversity, evolution, ecology, adaptation, and conservation, can be illustrated by museum projects. To show some of the types of lesson plans, concepts and projects for museum teaching, a set of notes for secondary teachers using the Mauritius Institute was prepared.

Primary Schools : The excellent new natural history syllabus to be introduced into primary schools in 1970 poses special problems for teachers. Few primary teachers have had training in biology and a central service providing information and advice on aspects of natural history should be of considerable help to them. Primary schools often lack resources for biology lessons and the resources of the museum would be available to such schools for 'ready-made' lessons with a wealth of illustrative material. An education service at the museum may indeed mean the difference between the success and failure of this new venture.

Senior Primary Schools : The group of senior primary schools to be augmented under present policy is very important in the overall development of realistic school programmes related to the needs of Mauritius. General science is a central part of the curriculum and biology is an important strand in this course. As in the case of primary schools, however, teachers are usually poorly trained in biology and schools lack facilities for the subject. A good museum service could do much to help these important schools.

V. *SECONDARY TEACHERS REACTIONS TO USING A MUSEUM FOR BIOLOGY LESSONS*

On Tuesday, 4th July, 1969, twenty experienced biology teachers visited the museum for introductory talks on using museums for biology lessons. They were given a talk by the Director, Mr. Claude Michel, and were shown the galleries where they worked out specific problems and assignments.

The response was very good. Of the twenty, only two had previously used the museum in their biology lessons and then only in a general way and not for the teaching of specific concepts.

After this meeting all agreed that they would use the museum in the future. The numbers of lessons they expected to give there in the next 12 months are listed below.

Number of Lessons per class per year	Number of teachers
1 - 2	4
3 - 4	8
5 - 6	5
5 - 8	0
9 - 10	1
11 - 12	2

When asked about use they might make of an education service all teachers responded enthusiastically. All agreed they would use the service extensively, some as frequently as once a week for lessons, general information and for the identification of specimens.

VI. *SPECIFIC PROPOSALS FOR AN EDUCATION SERVICE AT THE MAURITIUS INSTITUTE*

It is recommended that as soon as practicable (possibly in January 1970), an education service commence operation at the Mauritius Institute.

First Stage. At first the administrative requirements and scope of the service could be very modest. Requirements, initially, would involve the following:

1. Appointment of graduate teacher of biology as a full-time Education Officer.
2. A small amount of storage space and some limited facilities for building and housing a special teaching collection.
3. Some typing and duplicating facilities. In view of the limited clerical resources at the museum, it would be necessary to have typing and duplicating done elsewhere. It may be possible to use the typing pool of the Ministry of Education next door to the Institute.
4. A table or desk for the Education Officer and access to biological literature. These facilities could be provided in the research library on the floor above the galleries.
5. A small amount of technical assistance. Perhaps the appoint-

ment of a junior assistant (say at School Certificate standard) who could help collect and arrange material for the teaching and loan collections.

6. An opportunity for the Education Officer to discuss aspects of his work and to have lesson notes and other manuscripts checked for accuracy by a professional biologist. While it is appreciated that this educational service must be complementary to the present activities of the museum, it may be possible for the Director to undertake this, or to arrange for consultations with other biologists.

Need for a Classroom. Ideally a good education service in a museum should have a classroom to accommodate about 40 pupils. This could be used for introductory parts of the lessons, for consolidating observations after visits to the galleries, to allow pupils to see and handle specimens from the teaching collection, to show slides and films, and to function as an informal meeting place for pupils and teachers, and perhaps as a base for a Natural History Club for schools.

It is appreciated that at present this room cannot be easily provided by the Institute because of its heavily over-committed space. At first, however, it may be possible to set up a temporary meeting place for talks and for pupils to see specimens by organising park benches (for 40 pupils) in either the grounds or courtyard of the museum. A second alternative would be to utilise the present small art gallery as a classroom. The best of the paintings could be effectively re-hung in strategic locations in the library rooms of the upper floor where many more art lovers would have an opportunity of seeing and appreciating them. They could be numbered and an appropriate catalogue issued indicating their precise locations. The present art gallery would be an ideal classroom because it is away at the back of the galleries and is linked to the preparatory, storage and office sections, and to the galleries themselves. A third possibility would be to make some use of the research laboratory for teaching. It could be used as a classroom for small classes.

Further Development. After the appointment of a full-time Education Officer as counterpart it seems probable that a government request would bring international aid to develop the service. It may be possible to arrange, for example, for a short-term consultant to work for two or three months on the initial development of the service and then for an expert to come for a longer term to help consolidate the programme. Aid may be possible for teaching resources such as visual aids; resource literature; and for equipment and materials for the collection, preservation, storage and display of specimens for the loan and teaching collections.

Special Note. In establishing an educational service great care should be taken to ensure that it does not cut across the research and scholarship on which any museum makes its international reputation. Special additional staff should be appointed for the extra tasks involved. The professional curators should not be required to undertake the education service as an extra duty. Museum education is a special field that can only be developed by a trained and experienced biology teacher, co-operating of course with professional museum curators.

6.11.69

APPENDIX G

EXAMPLES OF APPARATUS FOR BIOLOGY TEACHING MADE FROM SIMPLE INEXPENSIVE MATERIALS

Prototypes of apparatus prepared by Mr. D. Griffiths, Technical Officer in the Educational Laboratories of the Centre for Advancement of Teaching, Macquarie University, Sydney, Australia, together with a prototype microprojector prepared by Mr. H.R. Mills, Unesco Expert, at the Audio-Visual Unit, John Kennedy College, Beau Bassin, Mauritius.

Report prepared by Dr. G.R. Meyer and Mr. D. Griffiths.

Introduction

In a letter dated 25th June, 1969 (reference TA/61/14/1), Mr. Richard, the Permanent Secretary, suggested a number of activities that might be undertaken with the two biology study groups during the present consultancy mission. These activities included the "preparation of local-made apparatus from rudimentary material, e.g.

potometer
aerator
klinostat
auxanometer
graduated pipettes and burettes
incubator
microprojector

As a result of this request work was undertaken at Macquarie University Centre for Advancement of Teaching from July to September 1969 to develop prototypes of the apparatus specified together with certain other equipment using inexpensive and readily available materials and simple techniques. Grateful acknowledgment is given here to Mr. David Griffiths who undertook this work. The apparatus and/or specifications were brought to Mauritius with me on September 28, 1969 and each piece was either used or discussed during the Unesco biology seminars October to December 1969. The prototype klinostat was also effectively demonstrated by Mr. M. Atchia during a lesson on television in the revision series October 1969.

On arriving in Mauritius I was delighted to meet Mr. H.R. Mills, a Unesco Expert, working on aspects of the I.L.O. Project "National System of Vocational and Technical Education" (junior level technician courses) at John Kennedy College. Mr. Mills expressed interest in visual aids and kindly agreed to share with me, one lecture on this topic in the series of seminars for biology teachers. For this purpose he designed the simple microprojector illustrated in this Appendix. This was described and demonstrated at the seminar held at Queen Elizabeth College Rose Hill, on the 28th October, 1969. Unfortunately written specifications were not provided for this equipment. The microprojector is represented in this Appendix by a photograph kindly provided by Mr. Mills.

Various practical demonstrations organised by groups of teachers on topics of the Unesco Booklets and the Cambridge Syllabus were presented very successfully as part of the Unesco seminar series. Wherever possible the prototype equipment described in this Appendix was included in these demonstrations. The purpose was to encourage teachers to develop their own equipment using simple materials and methods. Most seemed to welcome the approach and many agreed to make copies of the prototypes and to try to work out details of other apparatus, using similar principles.

10.12.69

AERATOR

Materials

Any glass container that can be effectively stoppered.

Bung or cork to fit vessel.

Lengths of glass tube.

Rubber tube.

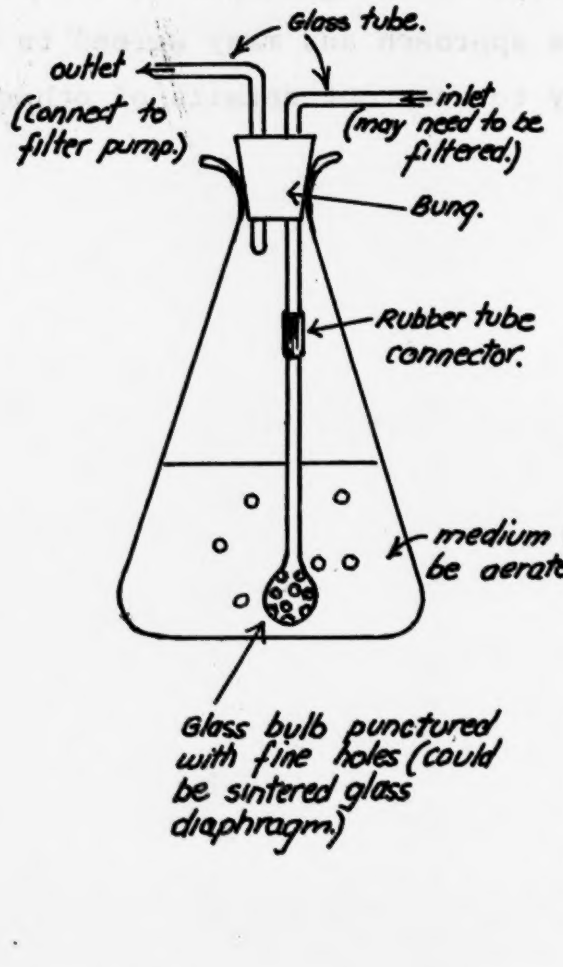
Filter (or water) pump.

Construction Guide

The ends of all the glass tubing should be fire polished (heated to remove sharp edges).

The short length of rubber tube allows the glass bulb to be connected after the bent tubes are inserted in the bung.

The perforated glass bulb may be modified to suit requirements, its main function is to disperse the air (gas) within the vessel to give efficient aeration.


Glass tube.
outlet
(connect to filter pump.)
inlet (may need to be filtered.)
Bung.
Rubber tube connector.
medium to be aerated.
Glass bulb punctured with fine holes (could be sintered glass diaphragm)

POTOMETER

Materials

10" glass capillary tube

1 mohr or bunsen clip

4 short lengths (2"-3") of soft rubber tube

1 rubber band

1 glass or metal "T" piece

1 old washed food can

Small amount of resin cored soft solder

1 short length of metal tube (copper, brass, steel not aluminium)

Construction Guide

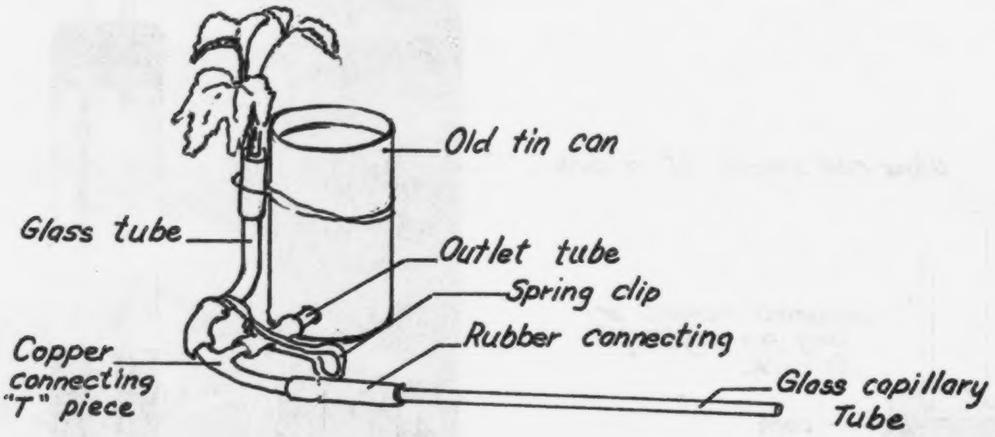
The tin can must be cleaned and all sharp edges removed.

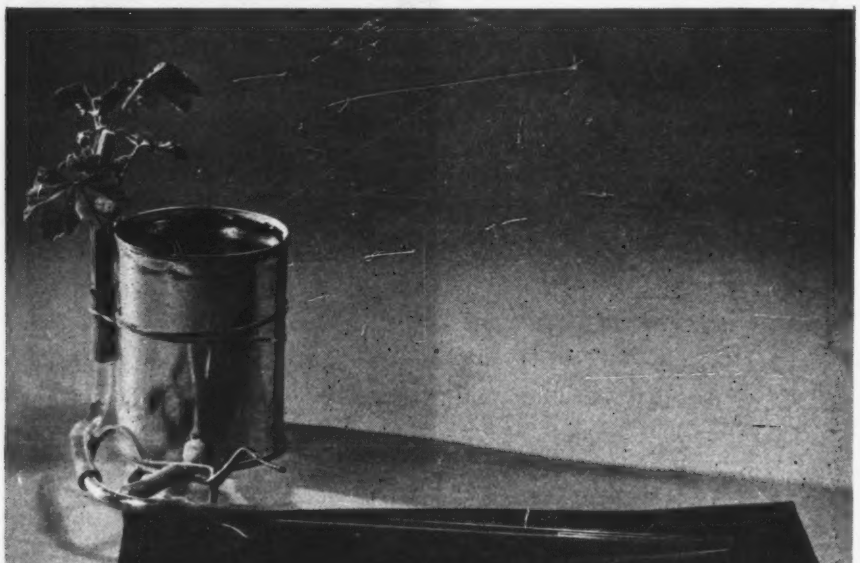
The short length of metal tube is soft soldered to the side of the can at the bottom. After soldering, a hole is carefully drilled or punched, using the tube as a guide.

The "T" piece may be made from metal or glass tube.

Soldering is only successful if the metals are thoroughly clean before heating.

A good seal between the rubber tube and the plant specimen is essential.


Old tin can
Glass tube
Outlet tube
Spring clip
Rubber connecting
Copper connecting "T" piece
Glass capillary Tube



AUXANOMETER (Root Growth)

Materials

10"-12" glass rod approx. ¼" diameter (could be glass tube with one end sealed)

1 mounted needle (or sharpened knitting needle)

1 glass vessel (preferably tall and narrow)

1 bung to fit glass vessel

1 piece of thin rubber (rubber glove or rubber balloon)

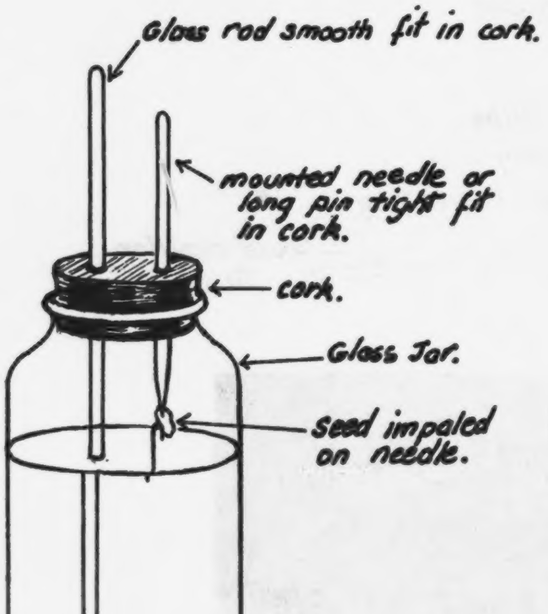
Vaseline

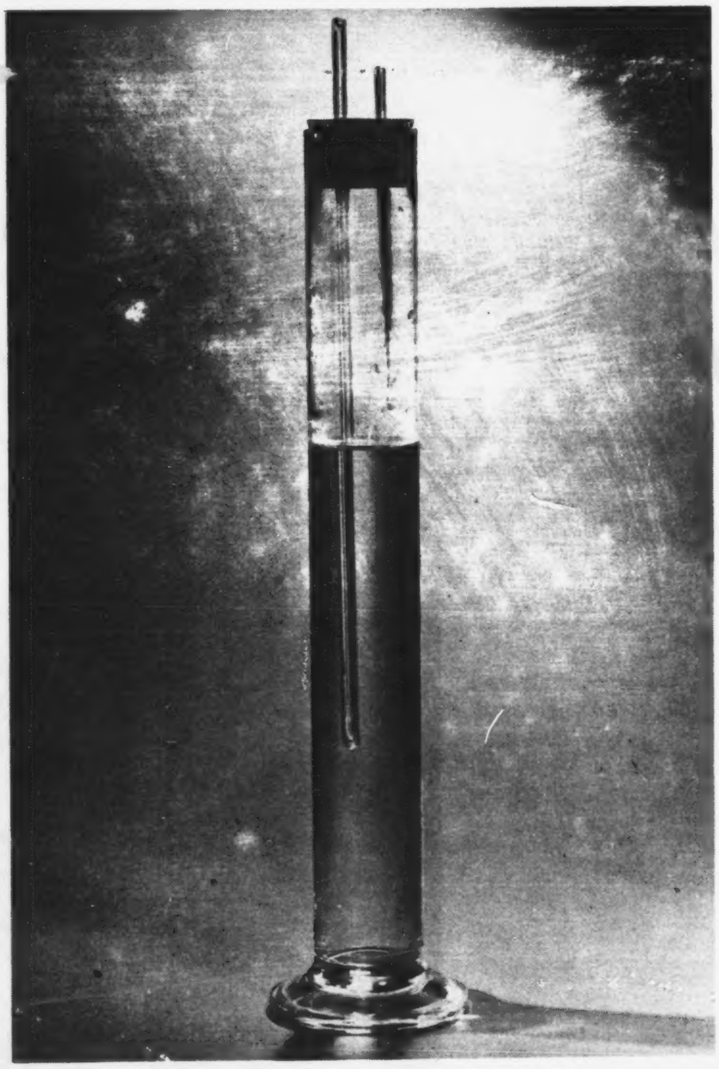
1 glass marking pencil

Construction Guide

A good seal at the top of the glass vessel and where the rods pass through is essential. This may be achieved by stretching a piece of thin rubber over the bung allowing the rods to pass through (not shown in the diagram or photograph).

The glass rod and needle should be lubricated (vaseline) to allow them to move freely through the bung.


Glass rod smooth fit in cork.
mounted needle or long pin tight fit in cork.
cork.
Glass Jar.
Seed impaled on needle.



SIMPLE CLOCKWORK KLINOSTAT

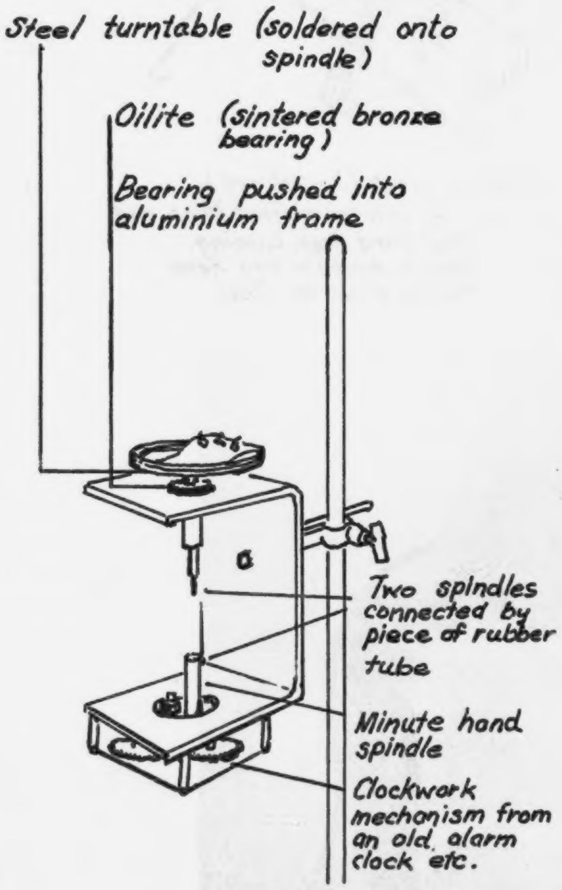
Materials

Sheet aluminium approximately 3½" x 12"

Clockwork mechanism from an inexpensive household clock

Short length of rubber or plastic tube to fit spindles

Sheet metal approximately 3" x 3" (steel, brass or tinplate)


Steel turntable (soldered onto spindle)
Oilite (sintered bronze bearing)
Bearing pushed into aluminium frame
Two spindles connected by piece of rubber tube
Minute hand spindle
Clockwork mechanism from an old alarm clock etc.

Construction Guide

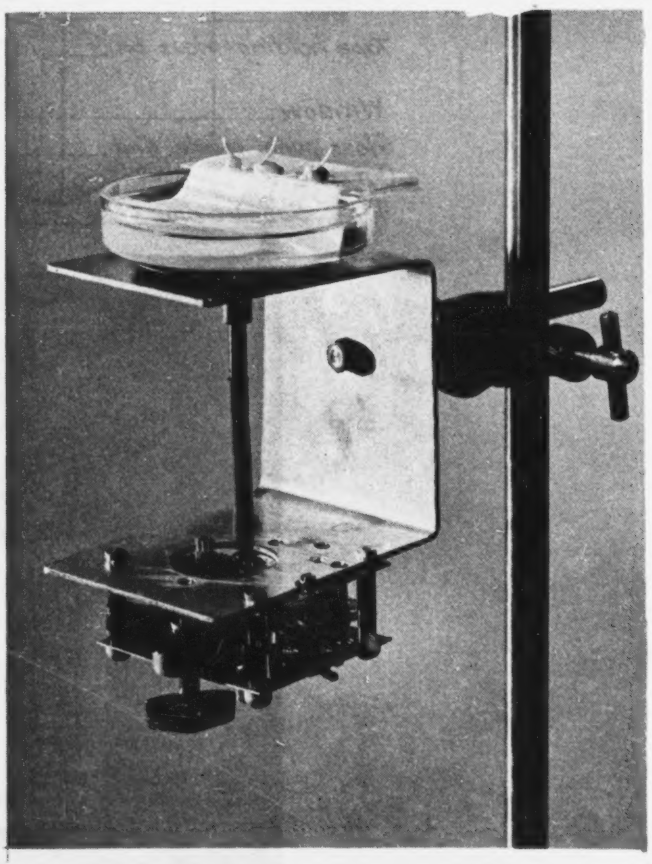
The clockwork mechanism should be stripped of all unwanted parts (case, glass, hands, etc. - keep these for future projects).

A support is then made from a piece of aluminium.

Careful marking out allows all drilling operations to be carried out before bending as extreme accuracy is not necessary as any small discrepancy in alignment is catered for by the rubber or plastic connector.

The top bearing may be of brass, bronze, nylon, teflon, etc. but is not essential as the aluminium will act as a bearing.

A small turntable is soldered (soft or hard) to the top of the spindle. The turntable must not rub on the aluminium. This may be avoided by making the rubber connector long enough to support the weight of the turntable and plant.



INCUBATOR

Materials

Two sheets of glass (or clear perspex) approximately 6" x 6"

Cardboard box approximately 18" x 14" x 14"

Old newspaper (large quantity)

Adhesive tape

Sheets of cardboard (old grocery boxes)

Lamp holder, preferably low voltage type

Low wattage lamp to suit holder

Connecting cable

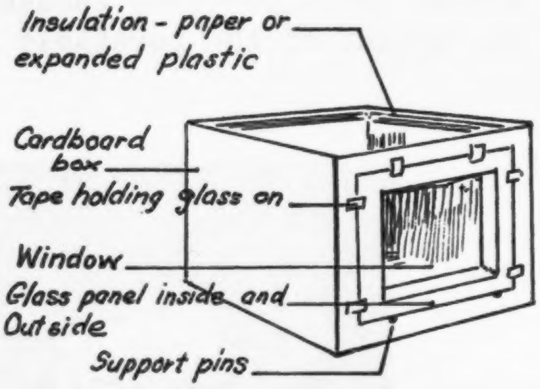
Tin can to protect lamp and act as heat shield

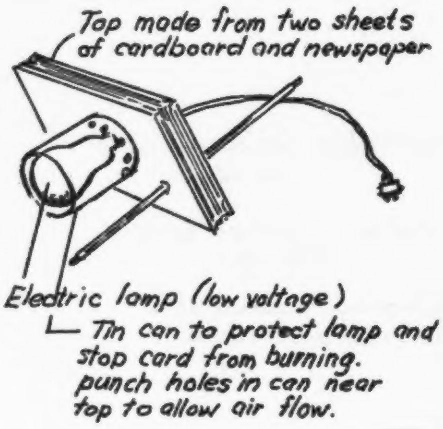
Thermometer

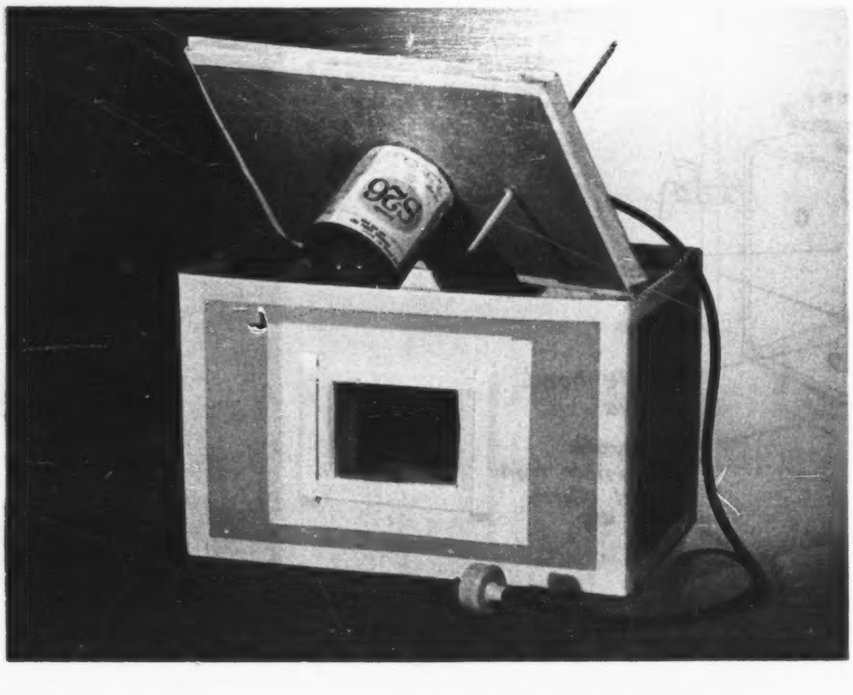
Construction Guide

For safety, the electric lamp should be of the low voltage type (not shown in photograph). The lamp is set in the box lid with the tin can as a protector and heat shield.

Sheets of newspaper are used to line the interior of the box and lid as an insulating layer. The windows are fitted using adhesive tape to hold the glass in position, one sheet inside and one outside.


Insulation - paper or expanded plastic
Cardboard box
Tape holding glass on
Window
Glass panel inside and Outside
Support pins


Top made from two sheets of cardboard and newspaper
Electric lamp (low voltage)
Tin can to protect lamp and stop card from burning. punch holes in can near top to allow air flow.



SIMPLE VENTIMETER

Materials

Stiff cardboard approximately 8" x 4"

Stiff wire approximately 6" (coat hanger wire)

Light but stiff aluminium foil approximately 3" x 1"

Adhesive tape or glue

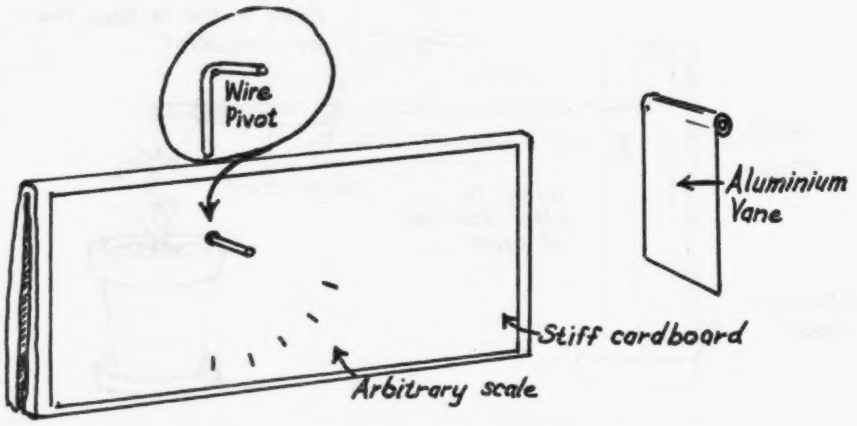
Construction Guide

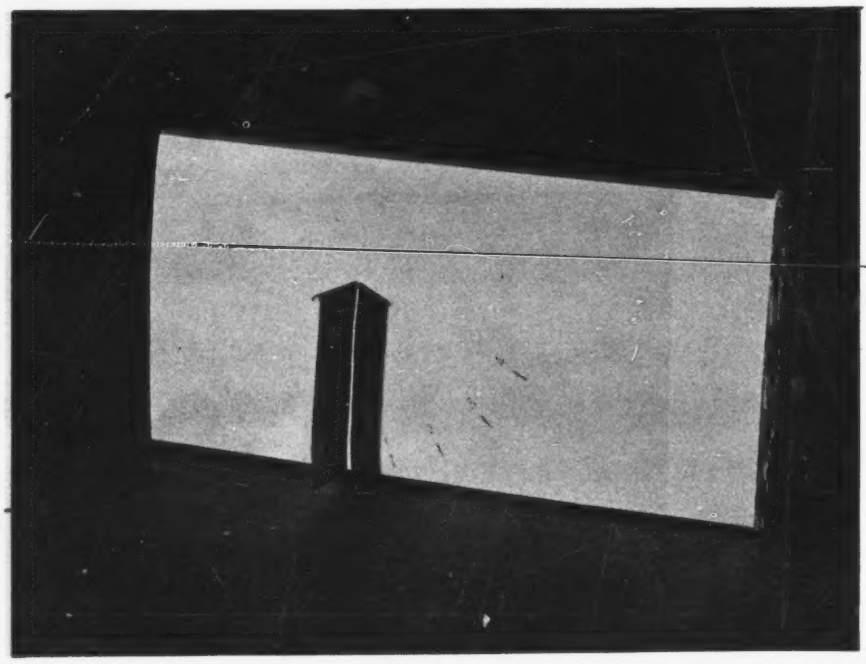
The rectangular aluminium vane is carefully rolled around a piece of the pivot wire to form a tube at one end (this acts as the bearing).

The pivot wire is then bent into a right angle making the short arm about ¼" longer than the width of the vane. The pivot is then pushed through the stiff cardboard approximately 1" from the top and the long arm affixed to the cardboard with clue or adhesive tape.

The scale may be calibrated by holding the ventimeter out of the window of a moving car and comparing the speedometer reading with the vane deflection.

For measurements above 6 feet the cardboard may be attached to a broomstick.





AUXANOMETER (Shoot Growth)

Materials

Stiff cardboard or thin wood 3" x 10"

White paper strips (one for each student) 3" x 10"

Four paper clips (not shown in diagram or photograph)

12" stiff wire for pointer (wire coat hanger or knitting needle)

1 short length of cotton thread

1 growing plant in pot

Wood for base approximately 3" x 6"

Small piece of lead or brass (counter weight)

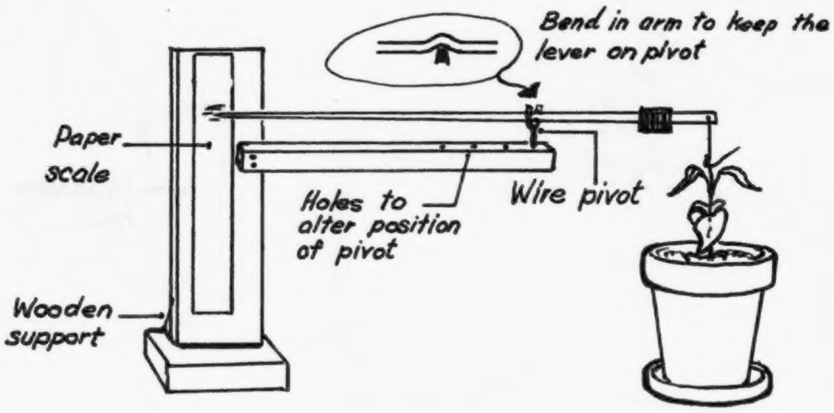
10"-12" dowel rod ¼"-3/8" diam.

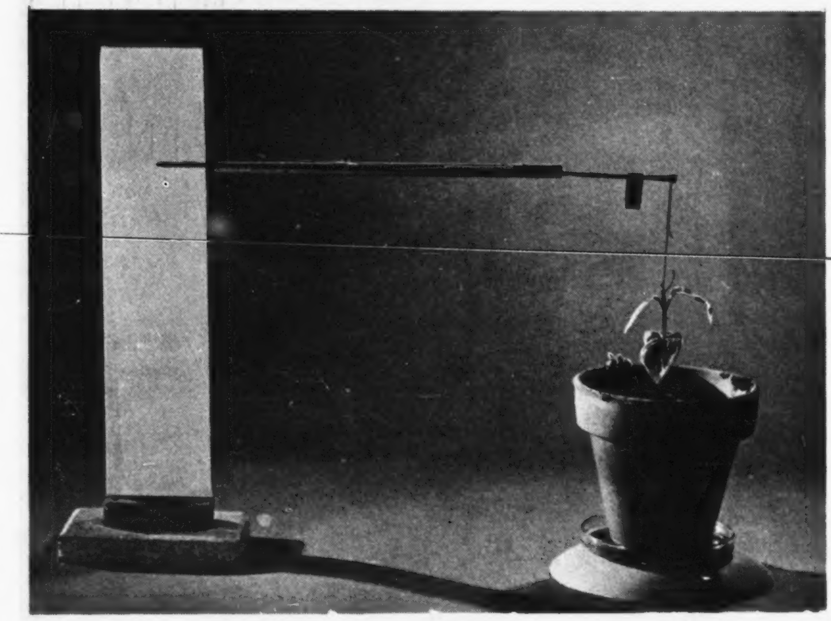
Construction Guide

A strip of wood 1" x 3" (cut from the 3" x 6" piece) is used to form a support for the 3" x 10" stiff cardboard. Nails and/or adhesive may be used for these joints.

The pointer should be bent or filed to form the pivot (which may be supported on a retort stand if it is not convenient to attach it to the scale). A short length of cotton thread must be carefully attached to the growing shoot and to the short end of the pointer.

The height of the plant pot may be adjusted to vary the pointer position at the start of the experiment.


Bend in arm to keep the lever on pivot
Paper scale
Holes to alter position of pivot
Wire pivot
Wooden support



BAROMETER

Materials

Glass jar or tin can with wide neck

Thin rubber (rubber glove or balloon)

Drinking straw or strip of light wood

Rubber band

Stiff cardboard

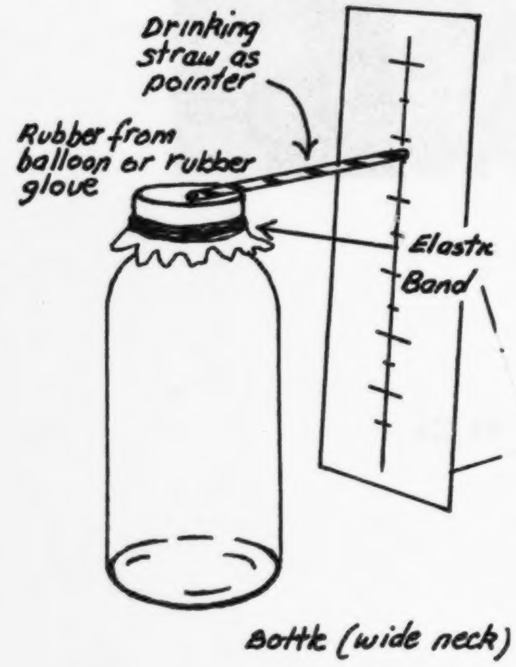
Adhesive

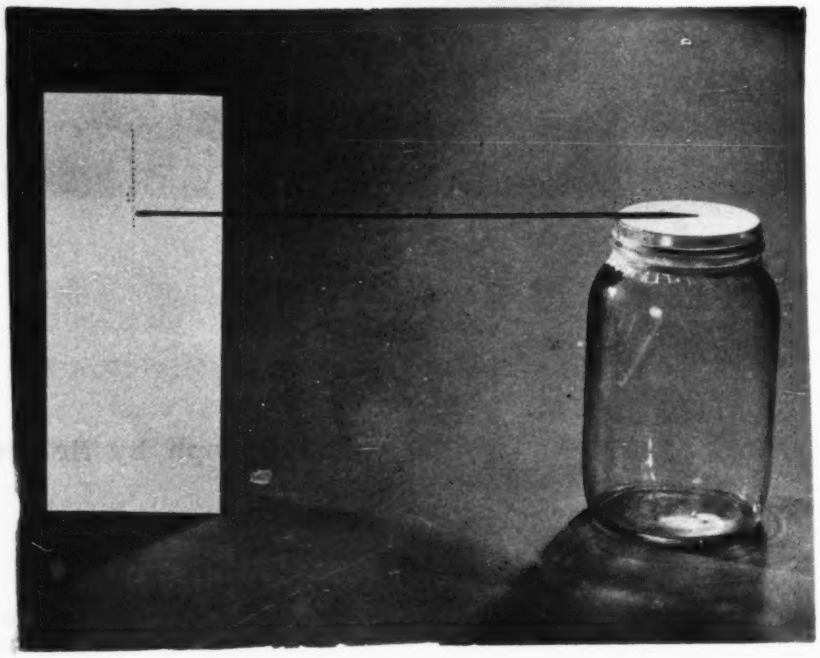
Construction Guide

A piece of thin rubber should be stretched over the neck of the container and held in position by a rubber band.

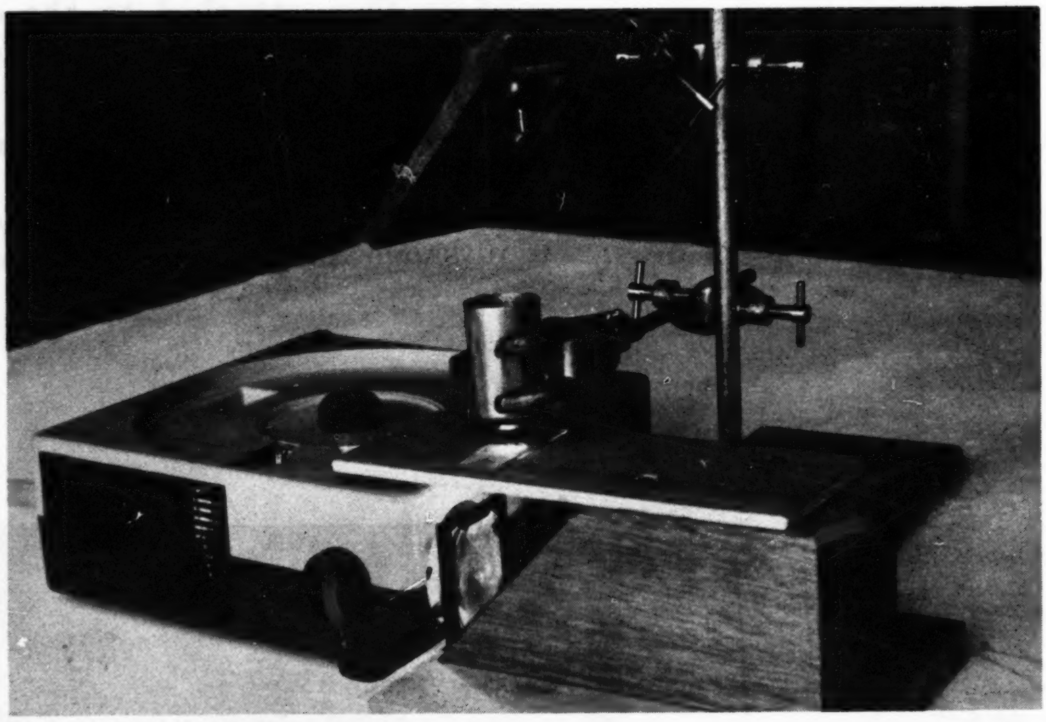
The drinking straw or strip of light wood is then attached to the centre of the rubber with a small quantity of adhesive.

The scale support is made from stiff cardboard to which a piece of note paper is attached with paper clips (not shown in diagram or photograph).


Drinking straw as pointer
Rubber from balloon or rubber glove
Elastic Band
Bottle (wide neck)



MICROPROJECTOR



Photograph by Mr. H.R. Mills

APPENDIX H

Proposal to the Ministry of Education and Cultural Affairs on the

ESTABLISHMENT AND DEVELOPMENT OF A PERMANENT EXECUTIVE GROUP OF BIOLOGY TEACHERS ASSISTED BY A CONSULTANCY COMMITTEE OF PROFESSIONAL BIOLOGISTS

SUMMARY

1. **In Mauritius, biology, compared with physics and chemistry, lacks status in secondary schools. It should, however, be one of the most important subjects because of its obvious contributions to general education and to national development.**
2. **The importance of biology has been recognised by the Government of Mauritius which has co-operated with the Unesco Pilot Project for Biology Teaching in Africa. Two study groups set up to work on the project continue with aspects of its development.**
3. **From October to December 1969, the two study groups have been amalgamated and enlarged. Seminars on aspects of biology teaching are held twice a week. There is also a programme of field excursions and related activities.**
4. **Teachers attending the seminars are at present being trained in techniques of in-service work, evaluation, curriculum construction and modern teaching methods.**
5. **It is recommended that the present group of teachers be formed into a permanent executive group to help with the development of biology teaching in Mauritius.**
6. **It is recommended that a consultative committee of professional biologists be formed to work with and advise biology teachers on aspects of their work.**

* * * * * *

PART I. THE PRESENT SITUATION

Formation of Biology Teachers Study Groups

At present biology is taught in all four State secondary schools and in some aided independent schools. As part of the programme in general science it is also taught in senior primary schools. Only few of the non-

aided schools teach the subject. In none of the schools, however, does biology have the same status popularity as physics and chemistry. The syllabuses followed in secondary schools are those prescribed by Cambridge University for the School Certificate and the Higher School Certificate. The examinations for these certificates are set and marked by Cambridge. These syllabuses give a reasonable general coverage of biology but are not directed to the specific needs of Mauritius. In addition, the Cambridge syllabuses are over long and contain a proportion of fairly traditional subject matter that has been deleted from many other school courses, both in Britain and elsewhere. The examinations set by Cambridge are mainly in the traditional essay-type style.

Biology teachers in Mauritius are few in number and have, at present, little opportunity for further education and professional training unless they go overseas. In Mauritius, there is no over-all system of in-service training. The situation of biology teaching in Mauritius before independence was therefore, generally unsatisfactory. This has been recognised by the Government and the Ministry of Education and Cultural Affairs has taken an obvious interest in upgrading the subject. There is recognition in the Ministry of the special significance of biology in the general education of Mauritians. With its obvious resources for solving problems of health, population, rural education, agriculture, pollution and conservation, biology is seen as an important part of general education. In addition, the biological basis of the economy of a largely agricultural nation is seen as a major factor in the need to upgrade biology teaching in the schools.

As an expression of this interest the government arranged for appropriate liaison with the Unesco Pilot Project for Biology Teaching in Africa and a delegate from Mauritius, Mr. M.H. Joomaye, was sent to the workshop in Cape Coast, Ghana in 1967. Two study groups were established in Mauritius in September 1965 to help with developing the Unesco materials and they have functioned well. The study groups have been led by Mr. M.H. Joomaye at the Royal College, Port Louis, and by Mr. N. Assarapin, Royal College, Curepipe. Unesco provided each study group with resource materials including a library of text and reference books. The study groups met separately in Port Louis and Curepipe.

During 1969, since the completion of the experimental editions of the Unesco materials, the activities of the study groups have been reduced and the members have been anxious to go ahead with further work.

Activities Since October 1969

On my arrival in Mauritius on the 28th September, 1969, it was necessary, first, to make an overall study of the educational system and to meet and talk with the biology teachers and the leaders of the study groups. By arrangement with the Permanent Secretary, Mr. Frank Richard, and the Chief Education Officer, Mr. S. Murday, I was taken by Mr. M.H. Joomaye, Education Officer, to a number of schools and other educational institutions. We also had preliminary meetings with biology teachers, especially members of the study groups. After appropriate discussions it was agreed that the most efficient method of work, at least during my period in Mauritius, would be to amalgamate the two study groups into one, meeting at a suitable place between Curepipe and Port Louis. Queen Elizabeth College, a State school for girls at Rose Hill was chosen as the most suitable venue. Fifteen teachers attended the first meeting on the 7th October, 1969.

A programme of activities was worked out for the group through until December. There were to be two seminars a week from 4 to 6.30 p.m. on Tuesdays and Fridays, together with occasional field excursions on Sundays. On Tuesdays, general problems of biology teaching were to be discussed and on Fridays there were to be activities associated with the Unesco Biology Pilot Project.

It was agreed to try and enlarge the group and to involve more biology teachers. In order to achieve this, an in-service course was organised under the leadership of the members of the original study groups. Circulars were sent to all secondary and senior primary schools and a part-time course was arranged under direct supervision of the Permanent Secretary and Ministry Officials. Mr. Frank Richard, the Permanent Secretary, officially opened the programme and welcomed those attending. The response was excellent. The course ran from Wednesday, 15th October to Tuesday, 21st October and included lectures, a field excursion, laboratory work and activity workshops. Including members of the original study groups, 35 teachers attended the course, almost every biology teacher in Mauritius. There was no decline in attendance from the first to last day.

See Attachments One to Three

The training was organised so that more experienced graduate teachers were given the opportunity to assist less well qualified and less experienced teachers. Each graduate leader took responsibility for about five others. The grouping worked well and seems a good model for further programmes of in-service training. Group leaders and less well experienced teachers gained a lot from working together.

At the conclusion of the course those teachers who were not members of the study groups were invited to continue attending the regular study group seminars. Almost all agreed to continue and attendance since has been very satisfactory, averaging 25 teachers per meeting. A regular series of field excursions and other activities has been organised in addition to the formal seminars. Duplicated notes are issued at almost all meetings and excursions.

The seminar each Friday now includes a section on practical work to illustrate topics common to the Unesco materials and the Cambridge Course for the School Certificate. This section is organised by graduate members of the group who present actual experiments for discussion and criticism. This is proving most successful.

PART II. POSSIBLE FUTURE ACTIVITIES FOR SECONDARY BIOLOGY TEACHERS

There is a number of activities that biology teachers could undertake to accelerate the development of biology teaching in Mauritius. Some of these could involve preparation of advisory syllabuses and programmes of evaluation of new syllabuses and recommendations for policy changes for consideration by the Ministry of Education and Cultural Affairs.

Other activities could include the organisation of in-service training courses and the writing of textbooks, teaching notes and other materials for schools. Biology teachers could also help with radio and television broadcasts for schools.

Such activities require co-ordination and some over-all administrative structure that ensures continuity of work and accuracy in both content and educational theory. The Ministry can do much to provide, directly, this co-ordination and control. With its limited personnel, however, and with its responsibilities at all levels and for all subjects, it cannot give full-time attention to the development of biology alone. A central co-ordinating institution such as a Teachers' College or a University Institute of Education, working closely with the Ministry of Education, would be an appropriate centre for such activities.

PART III. RECOMMENDATIONS FOR DEVELOPING BIOLOGY IN SCHOOLS THROUGH THE ACTIVITIES OF BIOLOGY TEACHERS

It is important to capitalize on and direct the present enthusiasm and co-operative attitude of biology teachers in Mauritius. In the absence of a centre such as an Institute of Education, it is recommended that the following administrative structure be implemented to co-ordinate the activities of these teachers.

1. The present fusion of the two study groups into one group be confirmed and made permanent.
2. The single group so formed be enlarged to include the 35 teachers at present enrolled in the seminar course. Other biology teachers be encouraged to join. The group be constituted as a Committee of Biology Teachers.
3. This Teachers' Committee could be administered directly by the Ministry of Education, with the Minister, the Chief Education Officer in charge of science as *ex officio* members. The President of the Science Teachers' Association of Mauritius or his delegate could also be a member *ex officio*. A senior member of the Ministry qualified and experienced in biology teaching should be Convenor and should appoint one member of the Committee as his Deputy.
4. The Teachers' Committee should meet regularly, say once a month, at Queen Elizabeth College.
5. The present Unesco library and other resources of the two original study groups at Royal Colleges Curepipe and Port Louis, could remain where they are to decentralize library services. A reference collection of biological materials should also be established at Queen Elizabeth College, Rose Hill.
6. Within the Teachers' Committee there be an Executive Sub-Committee and various groups to organise specific activities such as in-service courses or trialling new materials in schools.

7. A Consultative Committee of professional biologists be established to assist the teachers to organise their programme of activities. This group could perhaps assist in the following ways:-
    i. advise on details of the programme of activities for the year;
    ii. monitor the work of the group for biological accuracy;
    iii. be available for consultation on particular problems;
    iv. assist with the writing of resource units and information bulletins for teachers;
    v. make available the resources of their various institutions for research and development in the teaching of biology;
    vi. give talks to teachers and help with visits to field sites and institutions.
8. The Consultative Committee be led by the same group as the Biology Teachers' Committee, namely the Minister, the Permanent Secretary, the Chief Education Officer in charge of science and the President of the Science Teachers' Association or his delegate as *ex officio* members, and have the same Convenor. This Consultative Committee may not need to meet formally more than two or three times a year but its individual members should be available for talks with teachers at appropriate times. A suggested list of people who might be invited to serve on such a committee is attached. *See Attachment Four*
9. Liaison between the Consultative Committee and the Biology Teachers' Committee could be both formal and informal. Formally about six teachers could be elected by their committee to attend the meetings of the consultative group, or perhaps the teachers executive committee could attend. Informally members of both groups should be encouraged to keep closely in touch with each others activities and to co-operate on projects of mutual interest.
10. Should this model prove satisfactory, similar arrangements could be considered for physics and chemistry and perhaps for other subjects. However, biology teaching should be given first priority in this regard for the reasons outlined in the first part of this paper.
11. There is nothing in this arrangement to prevent it being administered eventually by any future central educational unit such as an

Institute of Education.

14.11.69

Attachments

1. List of members of the present biology seminars
2. Programme of seminars for biology teachers, October to December 1969
3. Circular advertising the in-service training course for biology teachers, 15th - 21st October, 1969
4. List of people suggested as possible members of a Consultative Committee

Attachment One

Names and Addresses of Teachers Attending Biology Seminars October to December 1969

Group leaders: * Mr. M. Joomaye, Ministry of Education, Edith Cavell Street
+ Mr. N. Assarapin, Royal College, Curepipe (also see no. 19)

Participants:

*	1.	Mr. Pierre Lee Mow Chee	St. Andrews School, Ambrose Street, Rose Hill.
+	2.	Mr. M. Atchia	Queen Elizabeth College, Rose Hill.
+	3.	Miss N. Larcher	Queen Elizabeth College, Rose Hill.
*	4.	Mrs. M. Orian	Loreto Convent, Curepipe.
+	5.	Reverend Mother de Rosaire	Loreto Convent, Curepipe.
*	6.	Mr. A. Ebramjee	Islamic Cultural College, 60 Sir Edgar Laurent Street, Port Louis.
-	7.	Mr. O. Joomye	Islamic Cultural College, 60 Sir Edgar Laurent Street, Port Louis.
	8.	Mr. R. Alleemuddar	Islamic Cultural College, 60 Sir Edgar Laurent Street, Port Louis.
	9.	Mr. R. Essack	Islamic Cultural College, 60 Sir Edgar Laurent Street, Port Louis.
	10.	Mr. E. Constant	Senior Primary School, de Caen Street, Port Louis.
	11.	Mr. B. Gopaul	Central School, Belle Rose.
*	12.	Mr. K. Domah	Royal College, Port Louis.
*	13.	Mr. F. Nemorin	Royal College, Port Louis.
+	14.	Mr. M.A. Joomye	John Kennedy College, Beau Bassin.
	15.	Mr. M. Ramloll	Presidency College, Curepipe.
	16.	Mr. A. Ghanty	Aleemiah College, Phoenix.
	17.	Mr. K. de Souza	St. Esprit College, Quatre Bornes.
	18.	Mr. R. Ramtoola (see also nos. 30 and 32)	Trinity College, Port Louis.
	19.	Mr. N. Assarapin (also shown above)	Royal College, Curepipe.
+	20.	Mr. G. Ohis	Royal College, Curepipe.

Members of original study groups:

* Royal College, Port Louis.

+ Royal College, Curepipe.

Participants: (contd.)

+ 21.	Mr. M. Coowar	Royal College, Curepipe.
22.	Miss Marie Ange Siou	Loreto Convent, Rose Hill.
23.	Miss Marie Therese Aliphon	Loreto Convent, Quatre Bornes.
24.	Miss Chantal Tow Cheong Wong	College de Bon & Perpetuel Secours, Beau Bassin.
25.	Miss Jenny Ah Kam	Loreto Convent, St. Pierre.
26.	Mrs. Olla Lisety	Loreto Convent, St. Pierre.
27.	Miss Jeannette Tow Cheong Wong	Loreto Convent, Vacoas.
28.	Mr. Dhun Dev Naga	Eastern College, Central Flacq.
29.	Mr. Ahmad Hossenbaccus	Eastern College, Central Flacq.
30.	Mr. M. Ally Bussawon	Trinity College, Port Louis.
31.	Mr. Cheung Leung Cheung	St. Andrews School, Ambrose Street, Rose Hill.
32.	Mr. H.R. Jankoo	Trinity College, Port Louis.
33.	Miss Donish Tien Sing Young	Notre Dame College, Curepipe.
34.	Sister Patricia	Loreto Convent, Curepipe.
35.	Mrs. S. Takoor	St. Mary's College, Rose Hill.

Members of original study groups:

* Royal College, Port Louis.

+ Royal College, Curepipe.

Attachment Two

Government of Mauritius
Ministry of Education and Cultural Affairs

SEMINAR FOR BIOLOGY TEACHERS - OCTOBER TO DECEMBER 1969

Participants : Experienced biology teachers
Mr. L.F. Edgerley, Chairman of the Public Service Board
Mr. H.R. Mills, Unesco Expert
Mr. Claude Michel, Mauritius Institute
Dr. Claude Ricaud, Mauritius Sugar Industry Research Institute
Dr. Rex Meyer, Unesco Consultant

Times of meetings : Tuesdays and Fridays, 4 to 6.30 p.m.

Place of meetings : Queen Elizabeth College, Rose Hill.

Also planned is a series of Sunday field excursions and a series of visits to educational centres.

I. *OBJECTIVES OF THE SEMINARS*

1. To review the suitability of the Unseco Biology booklets for the present Cambridge School Certificate Syllabus.
2. To prepare teachers to adapt and use the booklets for classes in 1970.
3. To plan a scheme for evaluating the effectiveness of the Unesco booklets for the Cambridge School Certificate Syllabus.
4. To consider and discuss some of the newer trends in biology teaching especially relevant to the Unesco programme
    a. teaching out-of-doors
    b. population ecology
    c. the discovery method in the teaching of practical work
    d. the use of simple materials for practical apparatus
    e. the use of visual aids (including TV)
    f. modern methods of testing and examining.
5. To organise and run at least one short in-service training course for biology teachers.
6. To plan for the eventual design and introduction of a special syllabus and locally set examinations for the School Certificate

and perhaps later for the Higher School Certificate.

7. To develop a five-year plan for biology teaching in Mauritius. How to develop the present group of teachers into the nucleus of a professional team to implement each phase of the plan.

II. PROGRAMME FOR TUESDAY MEETINGS (General Problems)

1. 7th October : Organisation and scope of the seminars. Functions of the Teaching Centre at Macquarie University in Sydney.
2. 14th October :
    a) General objectives and procedures of field teaching in biology.
    b) Population ecology : a modern aspect of biology.
3. 21st October : Workshop on constructing unit tests in biology (as part of a trial in-service training course).
4. 28th October : Visual aids in the teaching of biology (given jointly by Mr. H.R. Mills and Dr. G.R. Meyer)
5. 4th November : Using the Natural History Museum to teach biology. (To be held at the Mauritius Institute Port Louis with the co-operation of Mr. C. Michel).
6. 11th November : The ecology of the sugar-cane industry. Preparation of a field excursion on Sunday 16th (given by Dr. Claude Ricaud, Mauritius Sugar Industry Research Institute).
7. 18th November : Further aspects of practical work in biology using the inquiry method.
8. 25th November : The biology of the seashore. Procedures for the excursion on Sunday 30th November.
9. 2nd December : Techniques of micro-biology for school classes.
10. 9th December : General discussion (perhaps questions with notice).

III. PROGRAMME FOR FRIDAY MEETINGS (about Unesco Materials)

Note: Most meetings will be in two parts - (i) in the first hour, there will be a discussion of a specific problem associated with introducing and evaluating the Unesco materials; (ii) in the second hour (or more) selected teachers from the group will discuss and illustrate the teaching of specific topics common to the Unesco materials and the Cambridge School Certificate Syllabus.

1. 10th October : Correlation between Cambridge School Certificate Syllabus and the Unesco Pilot materials.
2. 17th October : The biology of the freshwater stream. Procedures for field excursion for Sunday 19th October.
3. 24th October : Television and the teaching of biology. (Meeting to be held at the MBC, Curepipe and discussion will be led by Mr. G. Grimmett of C.E.T.O., London). Possible extension to 7.30 p.m.
4. 31st October : a) Objectives of biology teaching in Mauritius.
   b) Nutrition and transport. Teaching aspects.
5. 7th November : a) Evaluating new teaching materials I.
   b) Respiration and excretion - teaching aspects.
6. 14th November : a) Evaluating new teaching materials II.
   b) Growth and locomotion - teaching aspects.
7. 21st November : a) Constructing tests and examinations for the new materials.
   b) Responsiveness - teaching aspects.
8. 29th November : a) Principles of designing a new syllabus in biology for the School Certificate in Mauritius.
   b) Reproduction - teaching aspects.
9. 5th December : a) Steps in the design of a new syllabus in biology for the School Certificate in Mauritius.
   b) Food relationships - teaching aspects.
10. 12th December a) Mapping out of a continued programme for the seminar 1970 - 1975.
    b) Soils - teaching aspects.
    c) General discussion (may continue to 8 p.m.).

IV. *SUNDAY FIELD EXCURSIONS*

A. Each main excursion will take the following form and will be for teachers only.

1. There will be a general lecture on the objectives and methods of the particular excursion. Each of these lectures has been programmed as part of the usual Tuesday or Friday series.
2. Each excursion will have the following time-table.

9.30 a.m.	Assemble at Park Hotel, Curepipe and travel to location.
10.30 a.m. - 1 p.m.	Field assignment.
1 p.m. - 1.30 p.m.	Lunch (please bring a packed lunch)
1.30 p.m. - 2.30 p.m.	Return travel to laboratory, Q.E.C.
2.30 p.m. - 5.30 p.m.	Observation of specimens. Assembly and discussion of results.

The programme is as follows:

19th October : A freshwater stream. Study of adaptive distribution and interdependence of freshwater organisms. (This has been included as part of the in-service training course).

26th October : Pine and eucalyptus forests. The structure of the forest and the community of organisms in the litter layers. (Mr. L.F. Edgerley will advise on this excursion).

16th November : Ecology of the cane-fields. Comparisons between well-managed and neglected fields (with co-operation of Dr. C. Ricaud).

30th November (subject to tides being suitable) : Biology of the seashore. Studies of adaptive distribution and interdependence of intertidal organisms on rocky shores.

B. Please note: Dr. Meyer would also be willing to make arrangements with individual teachers who might like their senior pupils (4th, 5th and 6th forms) to be taken on field excursions to freshwater or forest. He could hold such excursions on other Sundays to be arranged. Classes to be limited to 20 pupils.

14/10/69.

Attachment Three

Government of Mauritius

Ministry of Education and Cultural Affairs

IN-SERVICE TRAINING PROGRAMME FOR BIOLOGY TEACHERS IN SECONDARY SCHOOLS AND SENIOR PRIMARY SCHOOLS

Wednesday, 15th October to Tuesday, 21st October (except
Saturday, 18th), but including a full day field excursion
on Sunday, 19th October

Opening of programme by Mr. F. Richard, M.A., Permanent Secretary Ministry of Education, at the Queen Elizabeth College on Wednesday, 15th October at 4.15 p.m.

Details

All meetings will be held at the Queen Elizabeth College, Rose Hill at 4.15 p.m., except the Sunday field excursion for which the participants will meet at 9.30 a.m. at the Park Hotel, Curepipe.

The courses will be conducted by a group of experienced secondary school biology teachers and by Dr. G.R. Meyer, Unesco Consultant.

Programme

Wednesday 15th	The textbooks produced by Unesco for biology courses and their general usefulness in the Cambridge School Certificate programme.
Thursday 16th	Modern approaches to practical work through inquiry teaching.
Friday 17th	Field teaching. Case study : the ecology of a freshwater stream.
Sunday 19th	Excursion to a freshwater stream (9.30 a.m. to 6.30 p.m.)
Monday 20th	Modern methods of examining and testing in science teaching.
Tuesday 21st	Workshop on the construction of unit tests in biology.

The course is free of charge. Teachers interested in attending should complete the following form and return to Mr. M.H. Joomaye, Ministry of Education, Edith Cavell Street, Port Louis not later than Tuesday, 14th October and should attend, without waiting for further instructions, the first meeting at the Queen Elizabeth College, Rose Hill at 4.15 p.m. on Wednesday, 15th October, 1969.

Please detach and forward to Mr. M.H. Joomaye, Ministry of Education, Edith Cavell Street, Port Louis.

Surname ____________ Other names ____________ Telephone No. ____________

Name and address of school ____________________ Telephone No. ____________

____

Home address ____

Qualifications in biology ____________________

Attachment Four

LIST OF PEOPLE SUGGESTED AS POSSIBLE MEMBERS OF A CONSULTATIVE COMMITTEE OF PROFESSIONAL BIOLOGISTS

1. Members *Ex Officio*

The Minister of Education and Cultural Affairs

The Permanent Secretary (Education)

The Chief Education Officer in Charge of Science

The President of the Mauritius Association for Science Education

The lecturer in charge of Science at the Teachers' College

2. Regular Members

Mr. M.H. Joomaye (Convenor), Education Officer, Ministry of Education

Mr. L.F. Edgerley, O.B.E., Chairman of the Public Service Board, previously Conservator of Forests

Professor A.S. MacDonald, Professor of Agriculture, University of Mauritius

Mr. C. Michel, Director, Mauritius Institute

Dr. R.E. Vaughan, previously Director of Mauritius Sugar Industry Research Institute

Dr. C. Ricaud, Plant Pathologist, Mauritius Sugar Industry Research Institute

Mr. C.H. Courtois, Government Entomologist

Mr. B. Jugnarain, Superintendent, Botanical Gardens, Pamplemousses

3. Co-Opted Members

Representatives in Mauritius of international agencies interested in biology teaching, for example :

F.A.O.
I.L.O.
Unesco
W.H.O.
Peace Corps.

APPENDIX I

Government of Mauritius

PROPOSAL TO THE MINISTRY OF EDUCATION AND CULTURAL AFFAIRS ON A FIVE-YEAR PLAN FOR BIOLOGY TEACHING IN MAURITIUS

by

G.R. Meyer, Unesco Consultant

SUMMARY

1. Following acceptance by the Ministry of Education on the 14th November, 1969, of proposals to establish an Executive Committee of biology teachers advised by a Consultancy Committee of professional biologists, these groups were formally constituted by the end of November 1969.
2. Meetings with both groups were held to work out an administrative structure and a programme of future activities.
3. Various committees were formed to co-ordinate activities such as curriculum reform, in-service training, production of texts and other resources and production of programmes for educational television.
4. A workshop held on the 29th November, 1969, finalised details of a five-year plan for biology teaching in Mauritius. This included the development of a proposed new syllabus for Mauritius for the Cambridge School Certificate, an analysis of the relevance of certain Unesco materials for the present Cambridge syllabus, and a programme of in-service activities.

Background

Following acceptance by the Permanent Secretary, Mr. Frank Richard, on the 14th November, 1969, of proposals to establish a permanent executive group of biology teachers assisted by a Consultancy Committee of professional biologists, certain administrative arrangements were organised. These new arrangements were as follows :

1. At a meeting of the seminar group at Queen Elizabeth College on Saturday, 29th November, the group was formally constituted as an Executive Group of biology teachers. The purpose was to help in the development of biology teaching in Mauritius through various activities such as in-service courses, educational television,

curriculum reform and production of teaching materials. An executive sub-committee was appointed to co-ordinate activities.

2. A number of sub-committees was appointed to organise certain tasks. These sub-committees were :

   i) Executive
   ii) Television Production
   iii) In-Service Training
   iv) Syllabus Construction
   v) Evaluation
   vi) Correlation between Unesco and Cambridge

Saturday, 29th November was a full-day workshop to consider proposals made for possible activities for the next five years. These activities were as follows :

- a) Participation in the design and implementation of a new syllabus and curriculum in biology for Mauritius, 1970 to 1974.
- b) Participation in and advice on the production of programmes of E.T.V. in biology. Help with mounting and evaluating the programmes for each year 1970 to 1974.
- c) Organisation of in-service activities for biology teachers for 1970.
- d) Analysis and correlation with the Cambridge syllabus of materials produced by the Unesco Pilot Project for Biology Teaching in Africa. Full details of these proposals are set out in Attachment One.

See Attachment One

The teachers divided into various sub-committees to consider the proposals. The following work was finalised, bringing to a conclusion certain activities that had been developing during the seminar series.

- i) A proposal to the Curriculum Reform Committee of the Ministry of Education and Cultural Affairs for acceptance of a new syllabus in biology for the Cambridge School Certificate. This proposal is given here as Attachment Two.

See Attachment Two

ii) A programme of in-service activities was planned and agreed to for 1970. It was agreed in principle to continue similar activities in future years and also to give support through in-service training, to the new curriculum in biology should it be implemented.

iii) The group agreed in principle to undertake the type of activities proposed for the evaluation of new courses of study should the new syllabus be approved by the Ministry. Details were to be organised at subsequent meetings.

iv) The proposals for educational television were deferred for discussion to later meetings but were generally approved in broad outline.

v) The sub-committee to correlate the Unesco materials for the Pilot Project for Biology Teaching in Africa completed their work. They produced a detailed correlation chart comparing the contents of the two courses. This was to help teachers following the present Cambridge syllabus use the Unesco materials as resources. At the same time the chart would help teachers become familiar with the Unesco materials in readiness for a change-over to a new syllabus should such a syllabus be approved.

3. A preliminary meeting between representatives of the Ministry of Education and an invited group of professional biologists was held at Queen Elizabeth College on the 26th November, 1969. The Agenda of the meeting is given as Attachment Three.

See Attachment Three

The biologists at the meeting agreed to form a permanent Consultancy Committee to help biology teachers with their various activities. The minutes of the meeting are given as Attachment Four.

See Attachment Four

Essential Features of the Five-Year Plan

1. To design a new biology syllabus for Mauritius which stresses local materials and the local environment and which caters for the needs of the country. The course to replace the present programme for the Cambridge School Certificate Examination.

2. To set up an experimental programme to try out and evaluate the new course from 1970 to 1974 so that it can be examined by Cambridge for the first time in 1974.
3. To produce local texts and resource materials for the new course year by year for Forms I to V 1970 to 1974.
4. To organise biology teachers to arrange in-service activities both for general teaching and also to prepare for the new syllabus. Programmes to be given each year 1970 to 1974.
5. To arrange a system to encourage biology teachers to help in the production and evaluation of programmes of educational television.

1.12.69

Attachments

1. Executive committee of biology teachers. Suggestions for activities 1970 to 1974 for each sub-committee
2. Proposal by executive group of biology teachers to the Curriculum Reform Committee of the Ministry of Education for a new syllabus in biology for the Cambridge School Certificate
3. Letter of invitation and agenda for preliminary meeting to consider establishment of a consultancy group for biology teaching at Queen Elizabeth College, 26th November
4. Minutes of the preliminary meeting to consider establishment of Consultancy Committee

Attachment One

Government of Mauritius
Ministry of Education and Cultural Affairs - Unesco Biology Project

EXECUTIVE COMMITTEE OF BIOLOGY TEACHERS

Suggestions for Activities Proposed for Discussion
by
Dr. G.R. Meyer, Unesco Consultant
November 1969

A. *EXECUTIVE SUB-COMMITTEE*

Need for Executive Committee

In the absence of a central co-ordinating institute of education, biology teachers themselves should be active in various programmes to improve biology teaching. The following sub-committees have therefore been formed :

1. Television production
2. In-service training
3. Content of new syllabus
4. Evaluation of new syllabus
5. Syllabus headings
6. Correlation of Unesco materials with Cambridge School Certificate syllabus

An executive committee is necessary to co-ordinate and generally supervise the work of the sub-committees. Care has been taken, therefore, to have a representative of each sub-committee on the central executive committee.

Note : Sub-committees 5 and 6 should have completed work by the end of December 1969.

Possible Activities of Executive Sub-Committee

i) To hold a monthly meeting to hear and review reports from each sub-committee.

ii) To offer advice and to encourage activities of sub-committees.

iii) To establish new sub-committees for particular purposes, should these be required.

iv) To issue minutes in the form of a monthly newsletter for all biology teachers.

v) To organise library resources for the Executive Committee of biology teachers.

vi) To meet the Consultancy Committee at their regular committee meetings.

B. *SUB-COMMITTEE FOR TELEVISION PRODUCTION*

The Need for Biology Teachers to Help with Educational TV

Biology is essentially a visual science based on simple observation and experiment. It is, therefore, very suitable for television. This was well demonstrated by the recent series of programmes which concentrated on revision. In this series biological programmes were amongst the more successful productions.

Biology should, therefore, continue to be an important subject on educational TV. It should be developed both at primary and secondary levels and also used for teacher training and for the development and evaluation of new courses of study.

By continued broadcasts of biological topics the general educational value of the subject can be demonstrated to the community at large and so its popularity and status will be improved.

Whether or not a permanent group of biology teachers is formed to produce programmes, this committee can do a great deal to help in actual production and in the various activities associated with television lessons.

The Types of Activities that this Committee could Undertake

i) To assist with the actual production of programmes for
    a) secondary school biology
    b) primary school natural history
    c) training for biology teachers

ii) Assist in the preparation of notes for teachers and lesson guides for pupils to accompany each programme.

iii) Form a group to critically evaluate the effectiveness of each programme.

iv) Advise on themes, topics and over-all structure of the various series of programmes in biology.

v) Work co-operatively with the sub-committees on evaluation and syllabus content to advise how television can be most effective in the introduction and evaluation of the new biology course for the School Certificate.

Proposed Activities for 1970 to 1974

i) For each year 1970 to 1974, prepare a structured series of programme topics for specified forms of the primary and secondary school.

ii) Assist those teachers actually giving television lessons by
   a) suggesting interesting activities
   b) providing specimens for demonstrations in experiments
   c) commenting on preliminary drafts of scripts
   d) helping with the writing of notes for teachers and pupils

iii) Design a weekly programme for biology teachers using imported films and through talks by local biologists, biology teachers and overseas visitors. To be broadcast in the early morning, say 7.30 a.m.

iv) In their schools, organise procedures for making the television broadcasts most effective in the regular lessons. Give the information to other teachers in pamphlets and special broadcasts.

v) Organise in their schools, systematic and regular critical evaluation of each programme so that useful information can be given to producers and television teachers to improve the quality of the educational TV service.

C. SUB-COMMITTEE FOR IN-SERVICE TRAINING

Need for In-Service Training

Biology teaching in Mauritius is only now gaining equivalent status with physics and chemistry in secondary schools. In the absence of an institute of education to co-ordinate pre-service and in-service training, biology teachers are in danger of following routine methods and programmes and of not developing new and better points of view and methods of teaching. If biology is to continue to develop and to have improved status, both graduate and non-graduate teachers need continued in-service assistance. In addition, teachers trained mainly in physics and chemistry, or in other relevant disciplines, should be encouraged to train also in biology. Such teachers need a well organised system of in-service education.

Possible Models for In-Service Activities

i) Ideally, vacation, evening or weekend courses should be provided by a central agency such as an institute of education. Wherever possible, teachers should be given time off by their employers to attend such courses. Some sort of credit towards a Diploma or Certificate of Education should be possible through attendance at in-service courses. Employers should also recognise the extra qualifications gained and so offer improved conditions of employment.

ii) In the absence of a central training agency, teachers should organise in-service activities themselves. These activities could be organised through the Association of Science Education or by forming special subject committees, as in the case of the biology group.

iii) Courses should be arranged once or twice a year in vacations, weekends or evenings and work undertaken in groups with each experienced graduate teacher leading and helping about five non-graduate or less experienced teachers.

iv) The in-service training group should consider some joint meetings with the television sub-committee for biology. Television is a very important agency for in-service work and special broadcasts should be considered to assist teachers.

Some Criteria for Designing Effective In-Service Courses

i) Each course should have a central theme with clearly stated overall objectives.

ii) Each course should be fairly short, no more than say ten meetings at times most suitable for teachers.

iii) The content should deal very specifically with topics or teaching problems of the school syllabus and should be presented more or less at the level required in actual lessons.

iv) The course should have a minimum of straight lectures and a maximum of activities such as practical work, excursions and visits, evaluation workshops and discussion groups.

v) Fairly comprehensive notes should be prepared and issued to teachers on each activity and topic of the course.

vi) In-service courses are especially valuable to help with the introduction of new courses and so specific programmes should be designed for new courses in schools. For example in Mauritius -
   a) natural history in primary schools
   b) biology strand of the general science course for the senior primary school
   c) agriculture in the senior primary school
   d) the Unesco booklets as a resource for the Cambridge School Certificate syllabus
   e) the Unesco booklets as the basis for a new course in biology for the School Certificate

vii) In-service courses should not only be concerned with the content of biology. They should provide training in new educational trends such as -
   discovery learning
   environmental teaching
   using museums in biology teaching
   developing audio-visual aids
   objective examining
   evaluation of new courses of study

viii) Wherever possible, in-service courses should be used to produce actual resources for use by teachers. These could be lesson notes, prototypes of simple apparatus, audio-visual aids, or tests.

Some Possible Activities for 1970 to 1974

i) Short courses for primary teachers in natural history to assist with introducing the new syllabus. Note : these courses could be given by secondary teachers who at the same time would learn from the primary teachers how to give more effective lessons in low secondary grades.

ii) Courses for biology in general science and in agriculture for teachers in senior primary schools. Introduction between secondary and senior primary teachers in the organisation of such programmes would be of mutual benefit.

iii) By closely working with the syllabus content and evaluation sub-committees to present, early January, a specific course on the content and methods of the Unesco-based syllabus for the School Certificate.

January 1971 : First Form
1972 : Second Form (with some reference also to First Form)
1973 : Third Form)
1974 : Fourth Form) (with some reference also to earlier Forms)
1975 : Fifth Form)

iv) To organise groups of teachers for the production of resource materials, working in close co-operation with the syllabus content sub-committee. For example, production of:

unit tests
assignments for trips to the botanical gardens
assignments for field excursions to new areas
visual aids
apparatus
collection of specimens

v) Arrange one or two visits each year to field sites or institutions of interest in biology teaching. (Most of course,have appropriate teaching notes and assignment sheets produced for each visit).

E.g. - botanical gardens
rocky seashore
tea plantation
mangrove swamp
mountain heathland
conservation areas
Sugar Research Institute
Mauritius Institute
Central Laboratory of Candos Hospital
tea and sugar factories
Ministry of Health
Young Farmers Club Projects

vi) In consultation with the Mauritius Herbarium, develop one or more of the conservation areas listed below as a teaching resource for schools. This could involve the development of nature trials and the production of teaching notes, and of information pamphlets for children.

Conservation reserves -

Pouce Mountain
Corps de Garde Mountain
Concession Rivière
Perrier
Macabe
Petrin
Cocotte
Bel Ombre
Ile aux Aigrettes

vii) In consultation with the television sub-committee, design some special television programmes for teachers to be broadcast say at 7.30 a.m. on school days with perhaps one programme each week.

D. SUB-COMMITTEE ON PRODUCTION OF SYLLABUS HEADINGS FOR A NEW BIOLOGY COURSE FOR MAURITIUS

Need for a New Syllabus

Discussion during current seminars highlighted the need to produce a biology syllabus for the School Certificate that reflects specific needs of Mauritius. It was generally recognised that while the present Cambridge course provides a reasonable general coverage of biology, it does not sufficiently relate to the immediate environment of Mauritian pupils. It does not discuss the special problems of health, agriculture, over-population, conservation and pollution that are the special and urgent problems of this country.

It was agreed therefore, that a new course should be designed, taking care to make as much use as possible of the Unesco materials by adopting a practical inquiry-oriented and environmental philosophy.

Some Criteria for Consideration by the Committee (also see pages 10-18 of Unesco Study Guide)

i) The course should be teachable in the varied types of secondary schools now in Mauritius

ii) Care should be taken to avoid a purely academic programme. The course should be demonstrably *human* in orientation, stressing the biology of man and his relationships with environment.

iii) The programme should cater for the cultural backgrounds, interests and abilities of the highly varied Mauritian population.

iv) As instruction will not be in the mother tongue of the majority of pupils, care should be taken to minimize verbal learning and maximize learning through observation and practical activity. Topics should be selected accordingly.

v) All examples and types should be available in Mauritius.

vi) Full advantage should be taken of the particularly good opportunities for testing out-of-doors that are characteristic of this country.

vii) The special health, hygiene, population, agricultural and conservation problems of Mauritius should be prominently featured.

viii) Topics that can be illustrated by two Unesco materials should be given every consideration.

Suggested Activities

i) Prepare a statement of the purpose of the course. That is, for whom it is intended, for what schools and under what teaching conditions.

ii) To make a clear statement of the general educational objectives of the course.

iii) To recommend appropriate general methods of teaching.

iv) To list the main topics of the syllabus.

v) To arrange the broad topics of the course into a teaching sequence for years 1 to 5.

Note : the work of this sub-committee should be completed by mid-December 1969 and taken over by the syllabus content committee.

E. SUB-COMMITTEE ON SYLLABUS CONTENT

Need for Organising Details of Syllabus Content

This Committee, together with the evaluation group, is central in the development of a new course in biology. In order to organise the syllabus (produced by the Syllabus Headings Committee) into a teaching programme, detailed statements of content must be made for each form. These statements must then be organised into a programme and eventually into lesson notes.

The final set of lesson notes should then become the basis of developing local resource units or textbooks for the new course. Wherever possible it is recommended that use be made of the Unesco booklets as resources, e.g. for Form I, Unesco booklets 1, 2 and 3.

Suggested Sequence of Activities

i) In December 1969, draft a programme of lessons for first term 1970

ii) In January 1970, write out in detail a set of teaching notes for first term 1970, lesson by lesson.

iii) Through first term write detailed lesson notes for second term.

iv) Through second term do *two* things :

  a) Revise programme and lesson notes of first term on evidence provided by the evaluation sub-committee

  b) Produce detailed lesson notes for third term

v) Through third term do *two* things :

  a) Revise programme for second term on evidence provided by the evaluation sub-committee

  b) Produce detailed lesson notes for first term second form

vi) In December 1970, revise the programme and lesson notes for the whole first form sequence.

vii) Repeat this type of sequence through years 1970 - 1974 producing and continuously revising trial editions of lesson notes.

viii) By, say, 1972 it should be possible to produce virtually final editions of texts for forms 1 and 2 and each year thereafter to produce texts for each higher form.

ix) By 1973 teachers guides and ancillary materials should be in production. These should include published booklets of texts, perhaps based on those developed and used by the evaluation committee.

x) By 1974/5, a first edition of a textbook, with teachers manual and related materials, should be produced.

F. SUB-COMMITTEE ON EVALUATION

Need for Evaluation (see also pages 2 to 3 of Unesco Study Guide)

In Mauritius, evaluation of new curricula is of utmost importance because development of courses especially for local needs is relatively new in this country. In the absence of experience in the specialised techniques of curriculum development, some basic errors could be made in terms of difficulty, length, relevance, practicability and other factors. It is important therefore to test the effectiveness of the course as a whole and of each part of the course.

Selection of Schools for Evaluation

The syllabus and teaching programme devised by the appropriate committees must be tested out in experimental schools, closely supervised and controlled by a group of evaluators. Ideally, fairly large numbers of pupils should be involved to ensure that results can be applied to the whole school population. Large samples, however, require a large organisation for evaluation. The absence in Mauritius of a central educational research centre, such as an institute of education, means that the evaluation must be undertaken by teachers themselves. I therefore propose the following modest scheme.

One control (regular course) and one experimental class taught by the same teacher in only three schools:

a) State College
b) Independent aided school
c) Independent non-aided school

This would involve intensive evaluation in any one year of only three classes of forty (i.e. 120 pupils) in the experimental group and three classes of forty (120) in the control group. It would mean that new teaching materials would need to be supplied to only 140 pupils, and that detailed analysis of evaluation data be undertaken for only 140 pupils.

While the numbers are small, careful selection of schools ensures that they are reasonably representative.

Types of Data to be Collected Each Month

Each month one or two members of the evaluation team should visit each class and collect the following information - (A) and (B) from the experimental classes only (C) from the control classes as well.

(A) From pupils:

i) Give a short standardised test on achievement of understanding of the month's work.

ii) Give a questionnaire which assesses the level of interest and level of difficulty of each lesson given during the month - e.g. in the first column are listed the main topics you have learned during the last few weeks. In the second column you must vote 5, 4, 3, 2 or 1 according to how interested you are in the topic.

Vote 5 : If the topic was amongst the most interesting you have had in the past month in any subject.
4 : If the topic was above average interest.
3 : If the topic was about much the same interest as your average lesson.
2 : If the topic was rather uninteresting.
1 : If the topic was amongst the least interesting you have had in the past month in any subject.

In the third column you must vote 5, 4, 3, 2 or 1 according to whether the topic was easy or hard compared with other topics in any subject you have been taught in the past month.

Vote 5 : If the topic was one of the easiest you learned this month.
4 : If the topic was a little easier than your average lesson of the month.
3 : If the topic was about the same difficulty of most other topics you learned this month.
2 : If the topic was a little harder than your average lesson of the month.
1 : If the topic was one of the hardest you learned this month.

Lesson Topic	How Interesting? (Vote 5, 4, 3, 2 or 1)	How Difficult? (Vote 5, 4, 3, 2 or 1)
Snails		
Earthworms		
Bees etc.		

iii) Talk to selected pupils and examine the notebooks. Find out which topics seemed to have been understood or linked and which poorly understood or disliked.

(B) From teachers :

i) Give the same interest and difficulty questionnaire to the teacher as given to the pupil.

ii) Require the teacher to keep a "log book" of each lesson in which he notes specific problems, difficulties in experiments, amount of material, and reaction of pupils. Collect this log book each month.

iii) Discuss with the teacher details of log book and list his recommendations for alterations to the text, the programme and the syllabus.

(C) From observing particular lessons :

Observe one lesson in the control class and one in the experimental class to determine how far the objectives of the new course are being attained. Make the kind of observations set out in the tables on pages 8 and 9 of the Study Guide.

Data to be Collected Once a Term and Annually

In the last month of each term and in the last month of the year, issue questionnaires and evaluation tests as in (A) and (B) above to cover the work of the term and the whole year.

Interpreting and Using the Data

The work of each month, then of the term, and finally of the whole year, should be continuously revised in the light of evidence obtained from the monthly visits. There is no easy formula that can be applied in the interpretation of the results. Data from tests, questionnaires, log books, interviews and observations should be assessed as objectively as possible, taking particular notice of differences between schools. It might be reasonable for example, to accept as satisfactory 95% on the achievement test from the State School; 80% from the Independent Aided School, and 50% from the Independent non-Aided School. Targets for achievements must be determined fairly subjectively but should make use of available evidence, such as results of previous public examinations in the schools concerned.

The main object is to make the course interesting and teachable while maintaining adequate academic standards in the schools for which it is intended. "Teachability" means of course, whether or not the course is attaining the stated objectives of the curriculum.

Programme of Activities 1970 to 1974

1970 Evaluation and revision of new programme for first form. With Content Sub-Committee, producing a second edition of the teaching notes.

1971 Evaluation and revision of new programme for second form. Extension of First Form materials to all schools teaching biology. Teachers to keep monthly log books and evidence from these used to modify the First Form text.

1972 Third Form - further revision of First and Second Forms.

1973 Fourth Form - further revision of First, Second and Third Forms.

1974 Fifth Form - further revision of First, Second, Third and Fourth Forms.

1974/5

Production, with Content Sub-Committee, of final editions of texts, teachers guides and related materials.

G. SUB-COMMITTEE ON CORRELATING UNESCO BOOKLETS WITH THE CAMBRIDGE SCHOOL CERTIFICATE SYLLABUS

Need for Correlation Between the Two Courses

Preliminary analysis of the Unesco booklets during the seminar series for biology teachers suggested that these materials should provide useful resources for the current syllabus in biology for the Cambridge

School Certificate. It was generally considered by members of the seminar that the level of treatment of factual content of the booklets was suitable for Grades 1 to 3. Some members of the group considered that if the inquiry methods and open-ended practical experiences advocated in the booklets were treated thoroughly and conscientiously, then the standard obtained in topics common to the two courses, would be more than satisfactory for the Cambridge School Certificate Examinations. It was recognised, however, that some topics (e.g. sensitivity) were not treated in the Unesco booklets at standards acceptable for the present Cambridge syllabus.

There is, therefore, a need to carefully correlate the Unesco materials against the Cambridge syllabus. This is important because while some schools will be developing new courses during 1970 to 1974, others will still be following the old syllabus. In order to make it easier for schools to change over to the new course based on the Unesco philosophy, extensive use of the Unesco booklets as sources of ideas and as general resources should be encouraged. It is, therefore, important for those following the old syllabus to know exactly where their syllabus topics occur in the Unesco materials.

Suggested Activities

1. Prepare a correlation chart listing the topics of the Cambridge School Certificate in one column, the location of these topics in the Unesco materials in a second, and general comments on comparative standards in a third.
2. Write a page or so of general advice to teachers on how to make most effective use of the Unesco materials as resources for the present School Certificate syllabus.
3. Issue copies of the document to all secondary schools in Mauritius.
4. Discuss with the committee on in-service training how the Unesco materials could be utilised in future in-service activities for teachers following the old syllabus.

Note : The work of this Committee should be completed by about mid-December 1969.

Attachment Two

Government of Mauritius
Ministry of Education and Cultural Affairs

PROPOSAL BY EXECUTIVE GROUP OF BIOLOGY TEACHERS TO THE CURRICULUM REFORM COMMITTEE OF THE MINISTRY OF EDUCATION AND CULTURAL AFFAIRS FOR A NEW SYLLABUS IN BIOLOGY FOR THE CAMBRIDGE SCHOOL CERTIFICATE

The current series of biology seminars (October to December 1969) has been concerned with training biology teachers in modern methods of teaching and in techniques of constructing and evaluating new courses of study.

The seminars have been popular and well attended. The teachers have come to appreciate that the current biology syllabus for the Cambridge School Certificate does not meet the specific needs of the country or of individual Mauritian pupils. It was agreed that the group should design a new course for Mauritian schools and submit it for consideration by the Curriculum Reform Committee of the Ministry.

The biology teachers, therefore, are hopeful that the Ministry will approve the new course and submit it to the Examination Syndicate of the University of Cambridge as an alternative course for the School Certificate for students of Mauritius.

The proposed course gives greater opportunity for the use of local material and for the better understanding of local environment. In fact, the Unesco Pilot Project for Biology Teaching in Africa advocates this approach and consequently the Unesco materials will be useful in the teaching of this proposed course.

If this course were approved, it could be introduced experimentally to some First Form classes in 1970 and be examined by Cambridge for the first time in 1974.

The biology teachers, therefore, ask the Curriculum Reform Committee to give favourable consideration to these proposals.

Documents Submitted

I. Purposes and limitations
II. Statement of educational objectives
III. Recommended teaching strategies
IV. Main themes of the syllabus
V. Main concepts of the syllabus arranged in a five year teaching sequence

I. THE PURPOSES AND LIMITATIONS OF THE SYLLABUS

1. a) The course should be compulsory for the first two years, possibly extending to Form V (17 years), gradually, as the material produced by the group has been implemented and evaluated.

   b) It should be for boys and girls of average ability (after passing Standard VI Examination) for all secondary schools.
2. The course should aim primarily at general education to arouse the general awareness and interest of the pupils. The course should be, as required, modified and increased in complexity in the Upper Forms to suit a more academic standard.
3. Considering the different mother tongues of pupils in various parts of the country, the course should be in English. The pupils range from a diversity of habitats - dry, semi-humid, urban, rural and semi-rural areas. The course should, therefore, be related to the economic, geographical and social situations of the country, and should include aspects of (i) hygiene (micro-organisms and personal health); (ii) nutrition (diet, water and air, and pollution); (iii) local agriculture (tea, sugar cane, vegetables, and intensive local farming); (iv) fisheries (sea resources); (v) population growth (heredity and control); (vi) ecological principles applied to local geographic regions.
4. Lessons should be carried out in the normal classroom with the possibility of outdoor excursions, within or outside school hours. Basic and simple chemicals and home-made apparatus should be used. It is expected that there will be facilities for water supply, electricity, spirit lamps or gas stoves, in addition to a school garden. Microscopes, while not essential, would be desirable.
5. Biology should be taught as a separate subject with cross relations to chemistry and physics in various topics (diffusion and osmosis, light, tropism, synthesis, cultures). One could draw from some aspects of New Mathematics for teaching vital statistics. For example:

   a) population growth

   b) child growth

   c) variations in weight and size of seeds

6. The texts to be used by teachers are Unesco materials or reference books, or any schemes prepared by the study groups. The teacher is expected to devise his apparatus and visual aids, e.g. wall charts, models and specimens. He must draw on local material and on the enthusiasm of the pupils for help.
7. The minimum requirement for teachers should be H.S.C. or A Level in biology. However, teachers with a general degree in other science subjects and some elementary knowledge of biology may still be encouraged to teach the course, and follow in-service reorientation or retraining in modern methods of biology teaching.
8. Educational visits and outings are already carried out in quite a number of Primary and Secondary Schools. These must be further encouraged.

Limitations

The course has been devised in consideration that the teacher himself will have the following attributes:

He must be (a) qualified (minimum H.S.C.) - (or non-qualified in biology but qualified in other subjects, and willing to teach biology)
(b) enthusiastic
(c) relatively permanent
(d) full of initiative

Every effort should be made to improve the vocabulary of the pupils in English so that they can follow the proposed course of study.

Modest financial requirements must be met by the school or pupil for educational visits or field excursions.

The syllabus should be devised in such a way as to form part of an integrated course, with the possibility of joining in physics and chemistry courses later, if necessary. The transition should be gradual.

II. THE EDUCATIONAL OBJECTIVES OF THE NEW BIOLOGY SYLLABUS

1. To create a lasting interest in and understanding of science, and to develop a scientific attitude, keen observation, experimental technique, verification and ability to draw conclusions and solve problems.

2. To help pupils respect and value life.
3. To help pupils become aware of interdependence of living things, and to apply this to their own personal needs and those of the community.
4. To give an understanding of the relationship between health and happiness. To show the causes and control of disease and of mental health.
5. Stress should be on a practical rather than on a theoretical approach - first-hand knowledge - sharpens interest and leads to discovery.
6. We aim at making pupils more useful citizens concerned with present day problems, such as food production, over population, unemployment.
7. Understanding of conservation and over-exploitation of resources are important objectives (birds, forests, water, soil, plants). To make full use of local resources, e.g. sugar industry - biological facts that improve production should be known to all.
8. There should be close co-ordination of new knowledge gained in biology with previous knowledge gained in other branches of science and everyday life. This helps to train in problem-solving.
9. Manual skills should be developed to help solve problems such as unemployment, development of local industry. These skills also help in character training, accuracy, thoroughness, responsibility.
10. A love of and a pride in the earth should be encouraged, and a proper sense of values developed with regard to manual work.
11. Arousing critical spirit is another important aim of this course.
12. Finally, teachers should create a lasting interest in biology so that people may make full use of their leisure time.

Note : It is intended that these objectives be expressed in behavioural terms when the syllabus outline is expanded into a complete set of teaching notes.

III. RECOMMENDED TEACHING STRATEGIES FOR THE NEW COURSE

1. The teacher's approach should be one of challenge. Pupils should discover things and solve problems themselves.
2. Experimental work should be quantitative wherever possible.
3. Observation and experiment cannot be over-emphasised - the teacher should encourage it at every stage of the course.
4. As many field excursions as possible should be made.
5. Discussions, drawing up of charts, graphs, etc. should follow field work.
6. Local plants and animals are the most useful visual aid, and should be used as much as possible rather than overseas specimens.
7. Educational visits to farms, museums, natural history reserves, hospitals and ecological habitats should be encouraged.
8. Children should be encouraged to tackle problems on their own, and to carry out simple research.
9. Full use should be made of reference books and library facilities. Pupils should also be encouraged to talk and write about their discoveries and problems.
10. The teacher should be a consultant rather than a source of information - no spoon-feeding!
11. Pupils could be allowed to work at their own pace, if this will not handicap them in their end-of-term examination.
12. The teachers should ensure that the course is relevant to the immediate environment of the pupils.

IV. MAIN THEMES OF THE SYLLABUS

The stress is on man and his relationships with environment. There are four main themes -

A. MAN and his environment
B. MAN and natural resources useful to him
C. MAN : his living body
D. The living environment (diversity of life, flowering plant, mammal)

V. MAIN CONCEPTS OF THE SYLLABUS

Arranged in a Five Year Teaching Sequence

FORM I

- The world around us
- Classification (source of material : Unesco Booklet 1)
- Diversity of organisms
- Adaptation
  - (a) living in freshwater
  - (b) living on land
  - (c) living in the sea

FORM II

- Activities of living organisms
- Patterns of reproduction (source of material : Unesco Booklet 6)
  - (a) flowering plants
  - (b) vegetative
  - (c) toad
  - (d) mammals with special reference to Man
- Adaptation - adaptive diversity in living organisms

FORM III

- Food and life
  - (a) nutrition in plants
  - (b) nutrition in animals
  - (c) human nutrition
  - (d) food hygiene
- Interdependence
  - (a) food web
  - (b) competition
- Conservation of natural resources
- Disease (in Man and food crops)
- Plants of economic importance
  - (a) food crops
  - (b) forestry
  - (c) medicinal plants
  - (d) ornamental plants

FORM IV

- Organisation of life (cells)
- Transport systems

How energy is produced and used

Development

Movement in animals and plants

The sea around us

- (a) life on seashore, in lagoon, in sea
- (b) fisheries - agriculture
- (c) oyster culture
- (d) fish farms
- (e) shells

Transmission of characters

Population studies

FORM V

Transmission of characters

Population studies (organisms and Man)

Soil and micro-organisms

The land around us - the principles of gardening and farming

Homeostasis

Co-ordination

Man as a living organism (a synthesis of earlier work)

Attachment Three

Government of Mauritius

Ministry of Education and Cultural Affairs

Preliminary meeting to consider the establishment of a Consultancy Group for biology teaching.

Place - Queen Elizabeth College, Rose Hill

Date - 26th November, 1969

Time - 5 p.m.

AGENDA

1. Apologies
2. Opening by official from Ministry of Education
3. Review of present status of biology teaching in Mauritius
4. Description of the Unesco Pilot Project for Biology in Africa
5. Review of types of activities in biology teaching proposed for 1970
6. Description of present activities of biology teachers
7. Consideration of possible formation of a Consultancy Committee
8. Any other business

Secretary

Ministry of Education and
Cultural Affairs,
Port Louis.

15th November, 1969

Dear

At present in Mauritius, there is increasing interest in biology teaching in schools. Our Ministry is anxious to promote and further develop this interest. It is recognised that biology has a key role in both the general education of our citizens and in the development of the Mauritian economy.

At present a group of enthusiastic biology teachers has been organised as an Executive Committee to advise on new courses, to help with in-service training to conduct field excursions, and to produce teaching notes and other resources for schools.

We are keen to assist these teachers and to gain the maximum from their enthusiastic professional attitude. One way in which they could be helped would be to give them some contact with local naturalists and professional biologists. We are proposing, therefore, to form a small honorary Consultancy Committee. There is to be a preliminary meeting to consider this proposal. We trust that those attending will give favourable consideration to forming a Consultancy Committee.

We do not expect, incidentally, that the commitment will be heavy - perhaps it would involve only one or two formal meetings each year. We would hope, however, that the consultants would take an interest in the general activities of the biology teachers, helping informally with advice, information and encouragement.

I cordially invite you to this preliminary meeting to be held at Queen Elizabeth College, Rose Hill on 26th November, 1969 at 5 p.m., and trust that we can hope for your co-operation in this project.

Yours sincerely,

(Sgd.) F. RICHARD,
Permanent Secretary.

Attachment Four

Government of Mauritius
Ministry of Education and Cultural Affairs

Preliminary meeting to consider the establishment of a Consultancy Group for biology teaching.

Place - Queen Elizabeth College, Rose Hill
Date - 26th November, 1969
Time - 5 p.m.

MINUTES

In attendance:

Mr. S. Murday (representing the Ministry of Education)
Mr. M. Joomaye (Chairman)
Professor A.S. MacDonald
Dr. C. Ricaud
Mr. C. Michel
Mr. C.H. Courtois
Dr. G.R. Meyer (Unesco Consultant)

Unable to attend:

Dr. R.E. Vaughan
Mr. L.F. Edgerley
Mr. B. Jugnarain
Representatives of International Agencies

1. Apologies

Mr. Joomaye read a statement from Dr. R.E. Vaughan regretting he was unable to attend, but giving full personal support to the project and the support of the Mauritius Herbarium. He would be pleased to be a member of the Consultancy Group if it should be decided to form such a group.

2. Introductory Statement by Mr. S. Murday, Chief Education Officer

Mr. S. Murday welcomed those attending and on behalf of the Ministry thanked them for their co-operation. He explained that biology had fallen behind physics and chemistry in secondary schools for a number of reasons. He mentioned difficulties of practical work, the need for well equipped laboratories, the problems of drawing specimens, and the shortage of biology teachers. He explained that study groups set up by the Ministry some years ago started a new trend by making use of local material. He also mentioned the series of seminars being organised with the assistance of Dr. Meyer, a Unesco Consultant. He explained that the purpose of the present meeting was to consider the possibility of forming a consultancy group or committee to help biology teachers.

3. Review of Present Status of Biology Teaching in Mauritius

Mr. Joomaye outlined the present position of biology teaching in secondary schools. Almost all pupils take chemistry for the School Certificate, but physics and biology are taken in the proportion of two to one. It is taught in the four State Schools, and in some grant aided schools, but in few others. The prestige of the subject has improved in recent years and it is no longer regarded as a subject only suitable for less gifted pupils.

4. Description of the Unesco Pilot Project for Biology in Africa

Mr. Joomaye described seminars held in Ghana by Unesco in 1964 to plan a new approach to biology teaching in African countries. He explained that the approach adopted was ecological, with an emphasis on practical work and on learning by discovery. He said that a set of booklets had been produced and these could be used effectively by teaching the present Cambridge course for the School Certificate. The main difference was in approach rather than in content.

Dr. Meyer tabled a set of the said booklets and related materials and described their content and philosophy in more detail. He stressed that they were to be regarded only as sources of ideas for the development of local courses and materials in individual countries.

5. and 6. Review of Types of Activities in Biology Teaching Proposed for 1970 and a Description of Present Activities of Biology Teachers

The chairman tabled a list of 35 biology teachers currently attending a series of seminars and field excursions, organised with the cooperation of Dr. Meyer. He also issued copies of the programme.

Dr. Meyer described the objectives and content of the seminars. He said that the main objective of the seminar series was to prepare and train teachers for a programme of curriculum reform beginning in 1970. The chairman tabled lists of members of various sub-committees within the seminar group to undertake certain tasks in developing biology teaching over the next five to seven years. Dr. Meyer described the possible activities of these groups in more detail. He said that they all would contribute in some way to the development of a new course in biology for Mauritius, which would be recognised by Cambridge as an alternative local programme for the School Certificate. He was hopeful that this new course would draw much of its inspiration from the Unesco materials.

7. Consideration of Possible Formation of a Consultancy Committee

Mr. Joomaye explained that the work of the biology teachers in developing a new course and in writing new texts would be greatly assisted if there was a group of professional biologists to offer advice and to help with specific tasks. He asked those attending if they would be prepared to help in that way by forming a permanent consultancy group to meet once or twice a year and to be available to assist teachers from time to time. All those attending agreed to this proposal. It was agreed to form those present, together with Dr. R.E. Vaughan, into a permanent Consultancy Group for biology teaching.

The chairman said that he would invite others unable to attend this meeting to also join the group.

8. First Meeting

It was agreed that the first formal meeting of the Consultancy Group should be held at 5 p.m. on Wednesday, 3rd December, 1969 at Queen Elizabeth College. The purpose of the meeting would be to meet the Executive Committee of biology teachers and to discuss specific activities for 1970.

Mr. Murday then said how pleased he was that the Consultancy Group had been formed and again thanked those present for their co-operation. Mr. Joomaye added his thanks. The meeting closed at 6.20 p.m.

M. Joomaye,
Convenor.

APPENDIX J

NOTES ON THREE FINAL MEETINGS - 3rd, 4th and 10th DECEMBER, 1969

Introduction

The main objective of the present consultancy mission was to advise and assist the Ministry of Education and the two biology study groups in the organisation of in-service training activities, educational television, and trials and evaluation of new courses based on materials produced by the Unesco Pilot Project for Biology Teaching in Africa. Another important objective was to recommend long-term programmes of activities for the study groups integrated through a national co-ordinator into one unified programme. (See Section Two of this report on terms of reference and their interpretation).

I am happy to report that these two main objectives were achieved. Three meetings held during the last two weeks of the mission were significant in that they formally approved certain policies and activities for the future, consolidating various trends that had been emerging during previous weeks.

I. Consultancy Committee for Biology Teaching. Inaugural Meeting With Executive Group of Biology Teachers : 3rd December, 1969 at 5 p.m. at Queen Elizabeth College, Rose Hill

This was a very significant meeting because it brought together a permanent, and formally constituted biology consultancy group with a permanent and formally constituted executive group of biology teachers. The former group had been formed at a special meeting one week previously (See *Appendix I*, Attachments Three and Four). The latter group had been formed by amalgamating and augmenting the original Curepipe and Port Louis Study Groups. (See *Appendix I*). The two new permanent groups were convened by Mr. M.H. Joomaye, Education Officer in the Ministry of Education in charge of biology teaching in Mauritius. The activities of the groups were in this way brought together "by a national co-ordinator into one unified programme".

The programme of activities that had been approved in principle by the teachers at their meeting of the 29th November, was discussed and consolidated. It was agreed to undertake specific programmes of in-

service work; to run and evaluate trials of a new course based on the Unesco materials; to produce resource materials for the new course; and to organise and produce programmes on educational television in biology. Both teachers and consultants agreed to work together in these activities co-ordinated through various sub-committees.

The minutes of this meeting are presented here as Attachment One.

See Attachment One

II. Meeting of Advisory Board on Education (Ministry of Education) : 4th December, 1969 at 2 p.m. at Teachers' Training College, Beau Bassin

The Advisory Board consists of representatives of various types of schools or other interested agencies. It meets several times a year under the chairmanship of the Permanent Secretary. Its role is to advise the Ministry of Education on matters of policy.

I am pleased to report that the chairman, Mr. Frank Richard, extended an invitation to attend this meeting to describe the activities of the biology committees in curriculum reform and in-service training. At this point I would like to formally express my thanks and appreciation to Mr. Richard for extending this invitation.

The Advisory Board was given an account of the activities of the biology teachers and copies of seminar programmes, future in-service activities and of the proposed new syllabus in biology, were tabled. Members of the Advisory Board commented favourably on the achievements of the biology teachers. The chairman commented that syllabus reforms initiated by teachers themselves were of particular significance. He also suggested that the activities of the biology teachers may well serve as a model for curriculum reform in other subjects.

The minutes of this meeting are presented as Attachment Two

See Attachment Two

III. Special Meeting of Curriculum Reform Committee of Ministry of Education at Queen Elizabeth College, Rose Hill, on Wednesday, 10th December, 1969 at 9 a.m.

The Curriculum Reform Committee of the Ministry of Education approves new courses of study for schools of all levels. This special meeting was convened to consider proposals made by biology teachers to introduce a new syllabus for all Mauritian students as an alternative to the present Cambridge School Certificate course.

I am most grateful to the chairman, Mr. Sandra Murday, Chief Education Officer, for extending an invitation to attend this meeting.

At the meeting, Mr. Joomaye outlined the work of the Unesco biology seminars. The origins and objectives of the syllabus were then described in some detail. A scheme of trialling and evaluating the new course was described and discussed.

The committee approved the new syllabus and agreed that it should be introduced into pilot schools in 1970. Mr. Joomaye nominated three schools to give the new course in their First Forms in 1970. These schools were as follows :

Name and Address of School	Type of School	Name of Principal	Name of Biology Teacher
1. Royal College, Curepipe	State	Mr. B. Bathfield	Mr. G. Ohis
2. St. Andrews College, Rose Hill	Independent Aided	Rev. R. Donat	Mr. P. Lee Mow Chee
3. Presidency College, Curepipe Road	Independent Non-Aided	Mr. R. Rummun	Mr. M. Ramloll

The procedure for evaluation as proposed by the teachers' committee was described and approved.

It was agreed to approach the Cambridge Examination Syndicate through Unesco for formal approval of the new course as an experimental programme available only in Mauritius, and especially designed for Mauritian pupils.

The minutes of this meeting are given as Attachment Three.

See Attachment Three

Attachment One

Government of Mauritius
Ministry of Education and Cultural Affairs
Consultancy Committee for Biology Teaching
Inaugural Meeting with Executive Group of Biology Teachers

3rd December, 1969 at 5 p.m.

Queen Elizabeth College, Rose Hill

AGENDA

1. Welcome to consultants and teachers. Introduction of consultants.
2. Reports by representatives of the teachers on a proposed new syllabus in biology and associated activities.
3. Evaluation procedures for the new course of study.
4. Educational television.
5. Statements by consultants on possible assistance that could be provided for the activities proposed.
6. Any other business.

MINUTES

In attendance:

Mr. M.K. Joomaye (Chairman)

Dr. C. Ricaud

Professor A. MacDonald

Mr. C.H. Courtois

Mr. C. Michel

Dr. G.R. Meyer (Unesco)

22 biology teachers

Unable to attend:

Dr. R.E. Vaughan

Mr. L.F. Edgerley

Mr. B. Jugnarain

1. Introduction

Mr. Joomaye welcomed and introduced the consultants.

2. New Syllabus and Related Activities

Mr. Atchia tabled a copy of the proposed new syllabus for School Certificate biology and discussed it in some detail. He explained that each concept had been selected to be consistent with the stated purpose, objectives and teaching strategies. He regarded the headings of the syllabus to be tentative only, subject to modifications on the basis of trials.

Miss Larcher described the programme of in-service activities to be undertaken by teachers in 1970. She explained that this would include field excursions and laboratory activities.

3. Evaluation of the New Course

Dr. Meyer described the procedures to be used in evaluating the effectiveness of the new course. These involved monthly visits to experimental classes and certain tests and interviews.

4. Television

Mr. Joomaye summed up the proposed activities for biology TV programmes for 1970. There will be 32 programmes for School Certificate and Higher School Certificate. The presenters will during the course of their preparation, train the younger teachers in the production of programmes.

All teachers and consultants were asked to co-operate fully in the production of television programmes.

5. Role of Consultants

Each consultant outlined the facilities of his own institution and promised full support for the various activities proposed by the biology teachers. Dr. Meyer outlined some of the ways in which those consultants not able to be present at the meeting might be asked to assist.

6. Conclusion

The chairman summarised the activities of teachers and consultants proposed for 1970 and subsequent years, and on behalf of the Ministry of Education thanked all those attending for their co-operation. The meeting closed at 6.30 p.m.

M.H. Joomaye

Attachment Two

Minutes of Proceedings of the Second Meeting for 1969 of the Advisory Board on Education Held at the Teachers' Training College on Thursday, 4th December, 1969

Present:

Mr. F. Richard, Permanent Secretary, Ministry of Education and Cultural Affairs (in the chair)
Mother Redempta, Mother Provincial, Loreto Convent
Dr. J.C. Mohith, representative of the Hindu Education Authority
Mr. S. Maudhoo, representative of the Primary School Teachers' Union
Mr. J.N. Roy
The Reverend R. Donat
Mr. S. Dhanjee
Mr. A.C.A. Raman, M.B.E.
Dr. I. Mansoor
Mr. G. Telescourt, Senior Education Officer (Member and Secretary)

Absent:

The Reverend Father H. Espitalier Noel, representative of the Roman Catholic Authority
Mrs. Laure Pillay
Mr. B. Dabee, representative of the Government Teachers' Union
Mr. N. Rangasamy, representative of the Secondary and Preparatory School Teachers' Union
Dr. R. Chaperon

Apologies were received from Brother Remi (representative of the Roman Catholic Education Authority) and Mr. C.K.L. Yip Tong

In attendance:

Dr. G.R. Meyer, Unesco Consultant for Biology from Macquarie University, Sydney, Australia and
Mr. M. Joomaye, Education Officer in charge of the Biology Pilot Project in the Ministry of Education

MINUTES OF PROCEEDINGS

1. Minutes of Previous Meeting

The minutes of the previous meeting, which had been circulated, were approved without amendment.

2. Matters Arising from the Minutes

The chairman informed the Board that the course in New Mathematics had taken place in August. Run by two British Tutors, Mr. E.D. Cave and Mr. D. Skinner, with the collaboration of Mauritian Education Officer and officers from the Ministry of Education, the course had catered for the whole range of secondary school teachers. Next year a course for primary school teachers would be organised and, in that context, the Teachers' Training College would be putting up an exhibition of work in mathematics.

a) The Curriculum Research and Reform Committee

The Curriculum Research and Reform Committee had held a number of sittings, had interviewed persons concerned and visited institutions especially in connection with pre-primary education. There were 669 registered pre-primary schools, but the whole number of such schools in Mauritius could well be in the region of 1,000. These schools cater for children in the age range of 3-5 years. The Curriculum Research and Reform Committee would, in the near future, submit to the Ministry of Education an Interim Report on pre-primary education in Mauritius. The suggestions for reform would not aim at copying what was being done in highly developed countries, but would be made in consideration of our possibilities.

b) Educational Television

Until we can set up a regular television unit, the Ministry of Education next year would, if the Mauritius Broadcasting Corporation allows the facilities, run a regular every-day programme in the languages and the sciences for Cambridge School Certificate and Higher School Certificate pupils. Circulars had been issued by the Ministry of Education to find out which literature textbooks would be prepared in the various schools during 1970. The Ministry of Education was also studying the possibility of paying fees for the presentation of programmes. Thus the very best teacher/presenters would be chosen.

Co-ordinators had been appointed to submit to the Ministry the name of possible presenters. The final choice would lie with the Ministry. It was a fact that the educational television programmes reached and did good to a high number of pupils, and next year the Ministry of Education was planning to cover the syllabus in the above-mentioned subjects. The time allowed by the M.B.C. authorities had not made it possible to offer courses in more subjects. Notes would be prepared by presenters and sent out to the schools for teachers' guidance and to enable follow-up. Lessons in other disciplines would be given on the radio, but lessons in language and literature would be given both on TV and on the radio. The Ministry of Education was also envisaging building up in the Audio-Visual Division, a centre for graphics, posters, and other equipment for the use of present and future presenters.

c) The chairman informed the Board that the Junior Scholarship Examination had been delayed by one week on account of the late departure of the *Mauritius*.

d) As the Members of the Board were aware, the Industrial Trade Training Centre had been inaugurated. A sea school and trade testing centre were to be attached to and connected with training courses at the Industrial Trade Training Centre.

3. Biology Pilot Project

The chairman welcomed Dr. Meyer, who had been sent by Unesco in connection with the Biology Pilot Project for Africa and who had been working in collaboration with Mr. Joomaye on that project. Mr. Joomaye circulated to the members of the Board, papers relating to seminars held in the context of the Biology Pilot Project, and a paper containing proposals made by the Executive Group of biology teachers to the Curriculum Reform Committee of the Ministry of Education and Cultural Affairs.

a) Dr. Meyer thanked the chairman for inviting him to that meeting of the Advisory Board on education. He explained that Unesco had been developing a new set of materials for biology teaching in African countries, including Mauritius. Mauritius had been invited to help in the production of these materials and, three years ago, the Ministry of Education in Mauritius had sent two officers to a Unesco Seminar in Ghana to participate in the preparation of materials and textbooks. The new approach to the teaching of biology was concerned with environment as a source of ideas for various countries. This source of ideas was valuable for developing local courses in view of examinations. The Ministry of Education had requested from Unesco the services of a short-term consultant to further work on the biology pilot project ir Mauritius. There were some 35 biology teachers in Mauritius. Study groups had been set up which were meeting regularly twice a week. In the new approach to the study of biology said Dr. Meyer, there is insistence on the 'discovery' type of work and emphasis on *doing* rather than *talking* - hence the visits which have been paid to various sites, museums, etc. Moreover, the teachers who participate in the seminar have been initiated into the techniques of curriculum development and been drawn into assisting in curriculum reform. Thus a draft proposal has been prepared for a new syllabus to be considered by a special meeting of the Curriculum Research and Reform Committee. Biology teachers feel that the Cambridge School Certificate course is narrowly restricted and not adapted to local needs. There is no provision for topics like fishing, sugar cane, etc. The teachers feel that pupils should be encouraged to become interested in their environment. If the proposed draft syllabus is approved, it could be introduced in 1970 on a trial basis for the Cambridge Examinations in 1974.

b) The chairman welcomed the suggestions submitted by Dr. Meyer especially because they came from the teachers themselves. The chairman went on to say that a change in biology teaching was in key with changes in the teaching of other subjects - changes which all tend towards one goal, the Mauritianisation of our educational system. The chairman said that the Ministry of Education would like to record its thanks for the valuable work that had been done by Dr. Meyer. Mother Provincial also wished to thank Dr. Meyer on the part of the teachers of Loreto Convent, who had found the seminar on biology very interesting.

4. Matters Arising from Minutes of Previous Meeting

On a suggestion from Mother Provincial, the chairman, referring back to the minutes of the previous meeting, said that there had been no development yet in the project of setting up a Unit of Education in the

University of Mauritius. Approval had not yet been obtained from the Ministry of Finance. The chairman, however, pointed out that the projected Unit of Education would be concerned mainly with the training of secondary school teachers.

Training of Primary School Teachers

Mother Provincial said that she was concerned about the training of primary school teachers and, to that end, had previously approached the Permanent Secretary of the Ministry of Education. The chairman replied that the training of primary school teachers, which was carried out at the Teachers' Training College, was intended to qualify teachers for employment in the Government service. However, the Ministry of Education would study the possibility of making some places available at the Teachers' Training College for students sponsored by interested private schools.

Mother Provincial suggested the possibility of running lessons on TV for secondary school teachers, especially in respect of methodology. The chairman replied that, in fact, the Ministry of Education had thought of including this item in the 1970 Educational Television Programmes, but it had not been possible to include these lessons by reason of time limitation. Something might perhaps be done on the radio by way of teacher training for secondary school teachers. The chairman added that TV might also be used to change the mentality of parents regarding the teaching of certain subjects, e.g. new mathematics, and learning activities in general.

Dr. Meyer mentioned the practice in Australia of using canned programmes and showing educational films on TV in the morning.

b) Raising the Standard of the Primary School Leaving Certificate Examination

Mother Provincial asked about the possibility of raising the standard of the P.S.L.C. examination to enable primary school leavers to pass the entrance examination, common to certain schools like the Loreto Convent and St. Andrews; for it had been noted that pupils who had scored good results at the P.S.L.C. examination were often unsuccessful at the entrance examination.

The chairman explained that this question was linked up with the requirements for qualifying for the Junior Scholarship Examination. These requirements were laid down in the Education Code. Besides, the P.S.L.C. examination was intended to serve the dual purpose of a leaving and a qualifying examination. If the standard for passing the examination was raised, this might have a devastating effect on children regarding their future attitude to learning. Mr. Maudhoo said that the Primary School Teachers' Union had submitted a memorandum to the effect that the requirements for qualifying for the Junior Scholarship should be raised to 4 A's. The chairman said that this opinion would be communicated to the Ministry of Education and would be submitted for study to the Curriculum Research and Reform Committee.

c) Mother Provincial asked the chairman whether consideration could be given to abolishing the system of a set examination for Junior Scholarship and awarding the scholarships on the basis of school records. The chairman thought that this system would require six years to give a fair and full chance to all pupils though Head teachers have, some time ago, been invited to devise a system of school records for primary school pupils.

d) The History Syllabus

Mr. Raman asked whether the drafting of the History syllabus would be affected by Mr. Lamy's departure from the Ministry of Education. The chairman replied in the negative and added that authority was still being awaited from the Ministry of Finance to go ahead with the project.

e) Point of Entry for School Pupils

Dr. Mansoor suggested that the entry point and the point of age qualifications for scholarship and other examinations for school pupils should be 1st of January and not 1st January and 1st July respectively as is the present practice since our school year begins in January.

f) Mr. Maudhoo thought that the long August vacation caused a strain on school pupils, who under the present system have to take examinations soon after resuming studies in September. He suggested that the school year should end in July.

Mother Provincial mentioned that our school year was operative in function of Cambridge examinations.

The chairman thought that there might be a possibility in the future of liaising with the moderators for African examinations in view of making the beginning of our school year fall in September.

g) Syllabus for Secondary Schools

Mr. Maudhoo asked whether it was not possible for all our secondary schools to adopt the same syllabus. The chairman replied that, in fact, some schools were working according to the syllabuses which had been prepared in the Ministry for certain subjects of study and sent to all private secondary schools. Mother Provincial thought that teachers should have a certain amount of freedom in the choice of textbooks. Mr. Dhanjee said that, in respect of syllabus, the schools whose managers formed part of the Union of Managers of Private Secondary Schools had established uniformity.

5. Representation of Youth on the Advisory Board on Education

The chairman said that the Ministry of Education had been approached by the Mauritian Union of Students in this respect and articles had appeared in the local press on the necessity for youth to be represented on the Advisory Board on Education. The chairman thought that, with the creation of a new Ministry for Youth, the problem could now be solved.

10. The chairman concluded by saying that, since that was probably the last meeting of the Board this year, he would like to offer his best wishes to the Members for Christmas and the New Year. The Members thanked the chairman and offered reciprocal wishes. Mr. Raman also expressed the wish that the Board might meet more often next year.

11. The meeting was then adjourned to 1970.

F. Richard,
Chairman

(G. Telescourt)
Secretary

Ministry of Education and Cultural Affairs
Port Louis
8th December, 1969

Attachment Three

In reply please quote
M.E.78/013

Ministry of Education and
Cultural Affairs,
Port Louis,
Mauritius.

5th December, 1969.

Dear Sir,

Curriculum Research & Reform Committee

You are kindly requested to attend a special meeting of the Curriculum Research & Reform Committee which will be held at the Queen Elizabeth College on Wednesday 10th December 1969 at 9.00 a.m.

AGENDA

1. Report on activities of The Biology Seminar from October to December 1969
2. A proposed new syllabus in Biology for the Cambridge School Certificate
3. Propo sal to introduce the new course into trial in first form in 1970 and in higher forms in subsequent years. To be examined for the first time by Cambridge in 1974.

Yours faithfully,

(B. VEERASAMY)
for Secretary
Curriculum Reform Committee

Dr. Meyer,
c/o Ministry of Education.

Minutes of Proceedings of the Special Meeting of the Curriculum Research and Reform Committee Held on Wednesday, 10th December, 1969, at the Queen Elizabeth College Under the Chairmanship of Mr. S. Murday, Chief Education Officer

Members present were:

Miss M. Kishtoe, Headmistress, Queen Elizabeth College
Mr. C. Cure, Principal, Teacher Training College
Mr. G. Telescourt, Senior Education Officer
Mr. L.P. Ramyead, Ag. Principal Assistant Secretary
Mr. C. Ramchurn, Inspector of Schools
Dr. G.R. Meyer, Unesco Consultant for Biology
Mr. M.H. Joomaye, Education Officer

AGENDA

1. Report on activities of the biology seminar from October to December 1969
2. A proposed new syllabus in biology for the Cambridge School Certificate
3. Proposal to introduce the new course into trial in First Form in 1970 and in higher forms in subsequent years. To be examined for the first time by Cambridge in 1974.

The chairman opened the meeting by welcoming Dr. Meyer. He however apologised for being unable to stay as he had another meeting at the University and asked Miss Kishtoe to chair the meeting in his absence. With the permission of the chairman, Mr. Joomaye described the background by giving the history of the project. A pilot project was initiated by Unesco three years ago by holding a seminar in Ghana. The seminar was attended by Mr. Joomaye. The seminar had looked into the desirability of making the teaching of biology more meaningful by making the topic "Man and His Environment" the central theme of biological sciences. The seminar concluded that biology should be taught with an ecological bias. In the following year, an international working group of scientists met in Ghana to produce Unesco booklets and other teaching aids, the content of which was in consonance with the philosophy outlined in the earlier seminar.

On his return, Mr. Joomaye had developed a teaching programme, notes of which were regularly sent to all schools and to Unesco. The Ministry also was provided with a copy. Teachers were thus prepared for the more comprehensive activity that was to follow on the arrival of Dr. G.R. Meyer, the Unesco Consultant, whose services were requested by this Ministry under the item Technical Assistance of UNDP.

Dr. Meyer took over to explain to the committee the kind of work that had been planned and carried out.

Attachment One describes fully the activities. They included a series of twice weekly meetings for a period of ten weeks. At one series of meetings, Dr. Meyer expostulated on the theory and at the other series, teachers presented a demonstration. There were also Sunday field excursions with a full day (Saturday, 29th November) workshop to bring all the elements together to produce a new syllabus and a programme of activities for the years 1970-1974. This was the culmination of the activities of this mission. He also pointed out that there was an intensive one-week in-service training of the teachers in the presence of Mrs. Anne Hunwald, the Head of the Division of Science Teaching in Unesco, who visited the group from the 5th to the 12th November during her 4-week East African tour.

Dr. Meyer recommended a slow and gradual introduction of the course in 3 experimental classes to start in 1970. He also said that there would be feedback from the three pilot classes to the syllabus committee so as to modify the syllabus should this be found necessary. The modified syllabus would then be used by the new Forms One of 1971 and the same process would continue to operate until the whole spectrum (1970-1974) would have been tackled. Mr. Joomaye proposed the following schools where pilot classes would be run -

1. Royal College, Curepipe
2. St. Andrews School, Rose Hill
3. Presidency College, Curepipe

Mr. Cure asked whether this syllabus would be approved by Cambridge. Mr. Joomaye replied that if Mauritius would submit this syllabus through Unesco, it would meet with the approval of Cambridge.

Mr. L.P. Ramyead enquired about facilities to implement the new syllabus. Dr. Meyer pointed out that a consultancy committee made up of professional biologists had been constituted for the express purpose of helping the teachers. The members of this consultancy committee are -

Professor A. MacDonald, School of Agriculture, University of Mauritius
Dr. C. Ricaud, Mauritius Sugar Industry Research Institute
Mr. C. Michel, Mauritius Institute (Museum)
Mr. C. Courtois, Medical Entomologist
Dr. R. Vaughan, Director of the Herbarium
Mr. B. Jugnarain, Superintendent of the Pamplemousses Garden
Mr. L. Edgerley, Ex-Conservator of Forests

Mr. C. Ramchurn was anxious about the reaction of the parents to the new syllabus and also wanted some explanation about the procedure to be adopted if the experiment failed. After discussion, Dr. Meyer explained that the new syllabus is so designed that should the experiment fail, the teachers could go back to the traditional course without any difficulty and no harm would be done to the children as the difference between the old and new is one mainly of approach to and technique of teaching. Mr. Ramchurn pointed out that there might be some unfavourable reaction from the parents if children were to be set separate question papers. Mr.Telescourt suggested that only one paper need be set with two sections : one section involving questions from the new syllabus, and the other section from the traditional syllabus. He also said that the Advisory Board on Education had on the previous week been informed of the production of a new biology syllabus. Mr. Joomaye then summed up.

The committee then unanimously approved in principle :

(a) the new syllabus
(b) the introduction of the new syllabus in the three pilot schools in 1970, to be subsequently followed in all First Forms of all schools and so throughout all forms by 1975

(c) that the first Cambridge Examination would be held on the new syllabus in 1974

(d) the submission, for approval, to Cambridge, through Unesco, of the new syllabus

Secretary

APPENDIX K

PHOTOGRAPHS

PLATE 1a

SOME LEADERS IN CURRICULUM REFORM IN BIOLOGY IN MAURITIUS

1. Mr. M.H. Joomaye, Education Officer in Charge of Biology Teaching

2. Members of the Biology Consultancy Panel

   (From left to right) Professor A. MacDonald
   Dr. C. Ricaud
   Mr. S. Murday
   Mr. M.H. Joomaye
   Mr. C.H. Courtois
   Mr. C. Michel

3. Mr. Joomaye and Dr. Meyer discuss aspects of a biology seminar programme

4. Office of Mr. M. Joomaye, Ministry of Education

PLATE 1b

THE EDUCATIONAL SYSTEM, SENIOR PRIMARY SCHOOLS

5. The Art Room, Senior Primary School in Port Louis

6. A painting lesson

7. Basket work

8. Wood work

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PLATE II

THE EDUCATIONAL SYSTEM - PRIMARY SCHOOL

9.)
10.) The crowded playground of a Primary School near Rose Hill

11.)
12.) A writing lesson for Grade II

13. Grade V completes a test in preparation for the Primary School Leaving Certificate

14. A reading lesson in Grade III

15. A chart illustrating a lesson in number for Grade III

16. A relief map of Mauritius made of cement in the school playground

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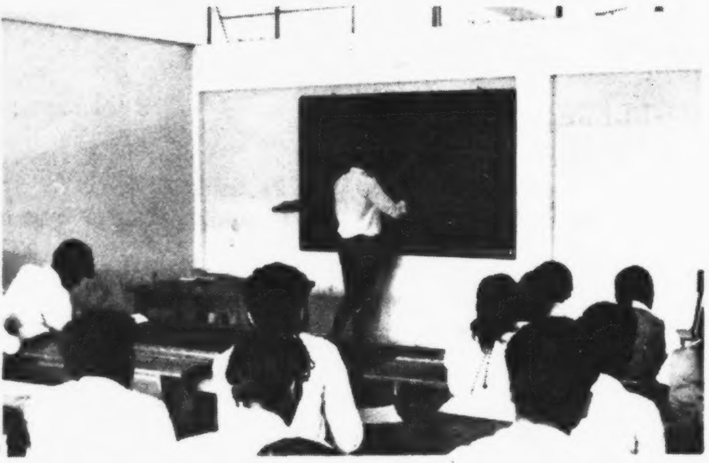

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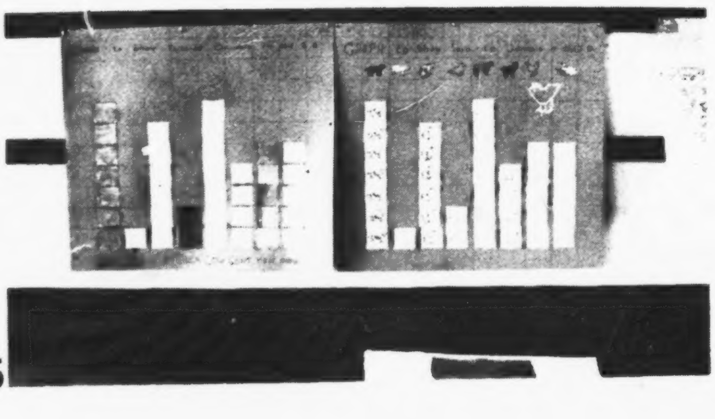

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PLATE IIIa

SOME EDUCATIONAL BUILDINGS

17. Buildings of the Teachers' College, Beau Bassin

18. Royal College, Port Louis

19. Queen Elizabeth College, Rose Hill

20. Science block, St. Andrews College, Rose Hill

PLATE IIIb

OPEN DAY AT ST. ANDREWS COLLEGE, ROSE HILL

21.)
22.) Biology exhibits

23. Needlework display

24. Demonstration of models for "new mathematics"

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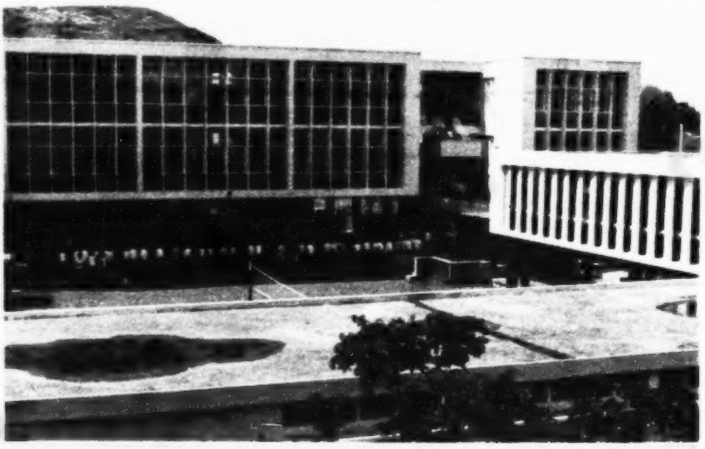
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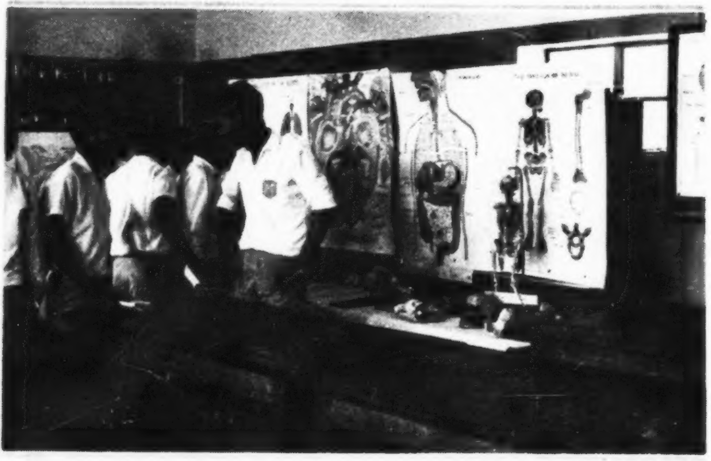
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PLATE IV

SCIENCE LESSONS IN SECONDARY SCHOOLS

25.) Demonstration of photosynthesis in Queen Elizabeth College,
26.) Rose Hill

27.)
to A biology lesson at Royal College, Curepipe
29.)

30. Chemistry lesson in an independent school, Port Louis

31. Practical physics in an outdoor laboratory at an independent school, Port Luis

32. Practical chemistry in an independent school, Mahebourg

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PLATE V

TEACHERS ATTEND AN EXCURSION TO A PINE FOREST

33. Mr. L.F. Edgerley discusses the biology of a pine forest

34. Mrs. A. Hunwald (Unesco) with a group of biology teachers

35. Examining characteristics of plants

36. Mrs. Hunwald and Mr. Edgerley discuss problems of biology teaching

37. Estimating plant cover

38. Measuring properties of soil

39.)
40.) Collecting insects

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PLATE VIa

TEACHERS STUDY CANE FIELDS

41. Discussing procedures

42. Examining leaves for disease organisms

43. Measuring the length of inter-nodes

44. Digging a soil profile

PLATE VIb

TEACHERS INVESTIGATING PLANT COLONIZATION ON A SANDY SHORE

45. Estimating plant cover under a banyan tree

46. Dr. Meyer discusses field techniques with teachers

47. Preparing a line transect

48. Reviewing data

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PLATE VII

TEACHERS IN CONFERENCE

49. Biology teachers at a full day conference on syllabus construction at Queen Elizabeth College, Rose Hill

50. Miss N. Larcher leads a group in preparing a programme of in-service activities

51. Teachers consider the special needs of senior primary schools in preparing an in-service programme for 1970

52. Determining teacher strategies and objectives for a new syllabus in biology - group led by Mr. F. Nemorin

53. Mr. M. Atchia leads discussion on the content of a new biology syllabus

54. Mr. M.H. Joomaye discusses details of television programmes in biology for 1970

55.) Dr. Meyer attends a farewell party organised by biology
56.) teachers

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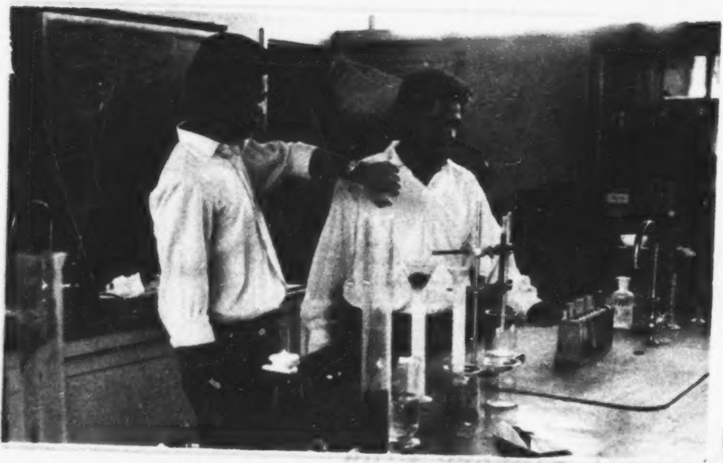
PLATE VIII

TEACHERS DEMONSTRATE PRACTICAL WORK

57.) to 61.) Mr. A. Embramjee and Mr. O. Joomye prepare demonstrations on the structure and properties of soil

62.) 63.) Teachers consider the results of an excursion to a cane field

64. Teachers study specimens collected during an excursion to a freshwater creek



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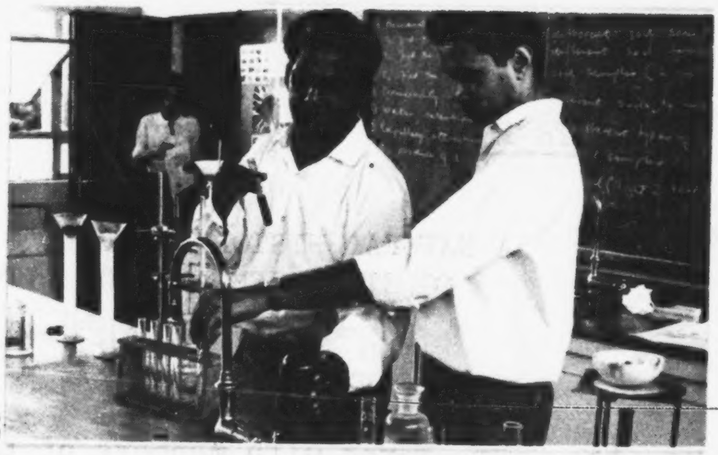

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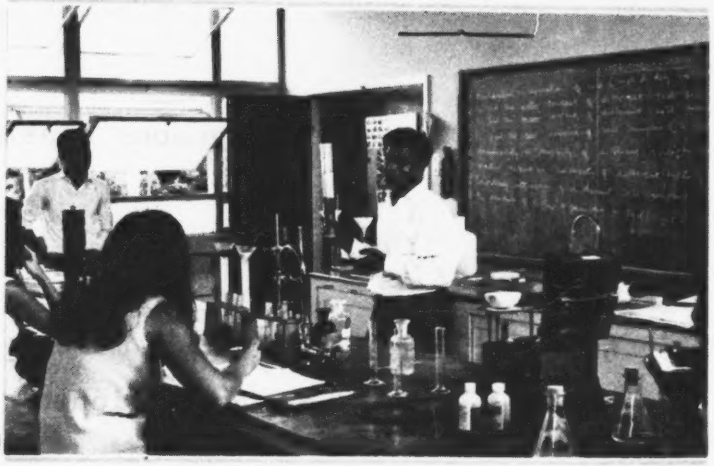

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PLATE IX

A NATURAL HISTORY RESERVE - A VISIT TO ILE AUX AIGRETTES TO STUDY REMNANTS OF LITTORAL FLORA OF MAURITIUS

65. Dr. Meyer with members of the Natural History Club

66.) to 68.) The unique indigenous coastal vegetation of Mauritius

69. Mr. France Staub, a member of the Natural History Club, photographs a rare lichen

70. Miss N. Larcher examines the profile of the forest

71. Mr. Staub studies the plant zonation on the rocky shore towards the climax vegetation of the island

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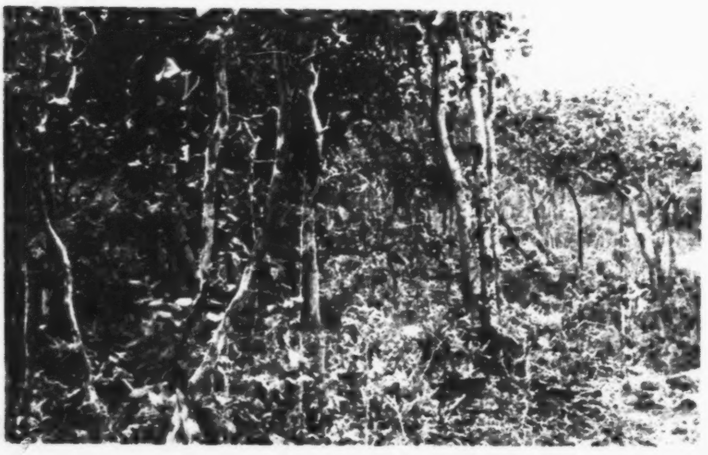

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PLATE X

PUPILS ON FIELD EXCURSIONS

72. Studying the soil under a banyan tree

73. Estimating plant cover on an excursion to a seashore

74.)
75.) Studying burrowing animals in beach sand

76. Collecting invertebrates of a freshwater stream

77. Assembling the results of a field excursion

78. Studying animals collected from a freshwater stream

79. Reviewing data from a freshwater excursion

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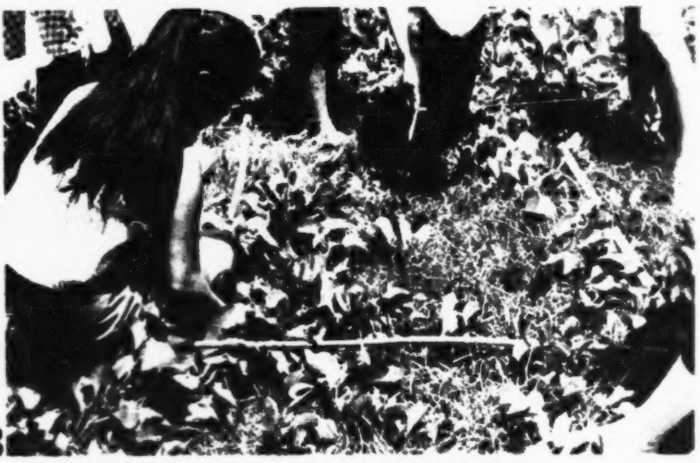
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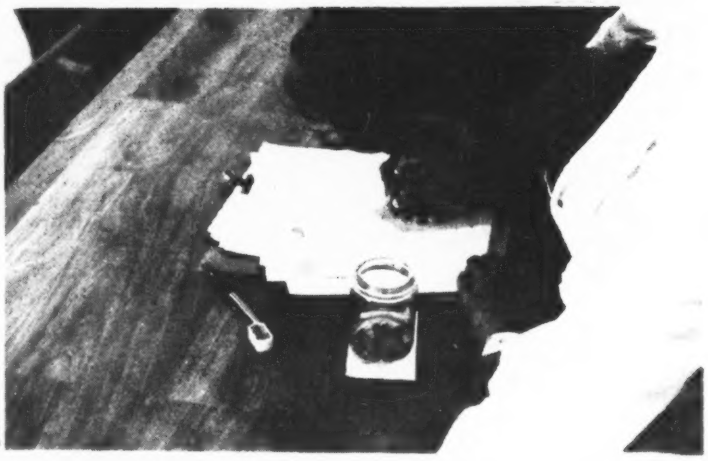
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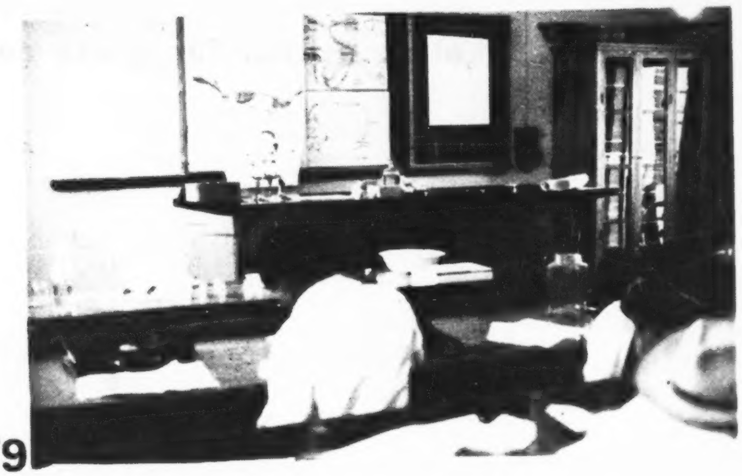
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PLATE XI

ACTIVITIES OF THE YOUNG FARMERS ASSOCIATION MAURITIUS

80. A successful vegetable garden near Petite Riviere

81. A successful onion crop at Petit Riviere

82. A good rice crop near Riviere Seche

83. A crop that failed - beds of onion dried out through lack of rain, near Trou Deau Douce

84. A moderately successful crop of egg plant near Trou Deau Douce

85. Pig raising near Poudre d'or

86. The beginnings of oyster production near Poudre d'or

87. Building stalls for goats and pigs near Poudre d'or

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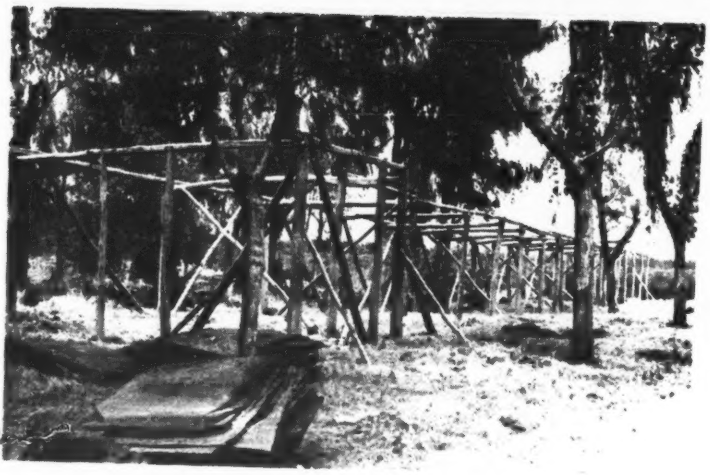

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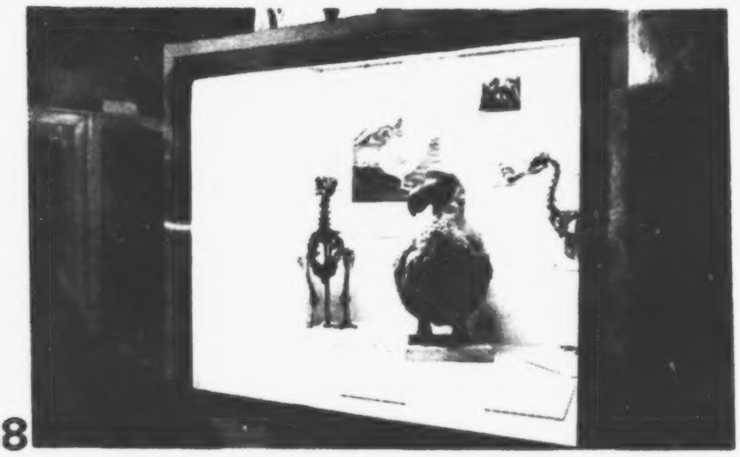
PLATE XII

MAURITIUS INSTITUTE (NATURAL HISTORY MUSEUM)

88.) to 92.)	Public galleries showing various types of exhibits
93.	Teachers visit the Library of the Mauritius Institute
94.) 95.)	Teachers complete biology assignments at the Institute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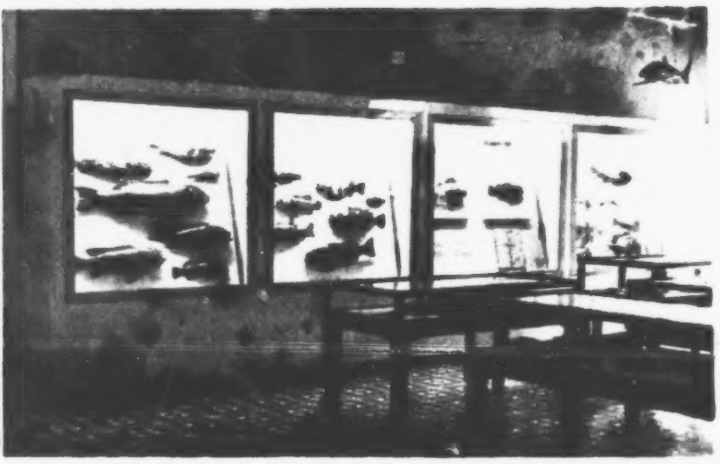
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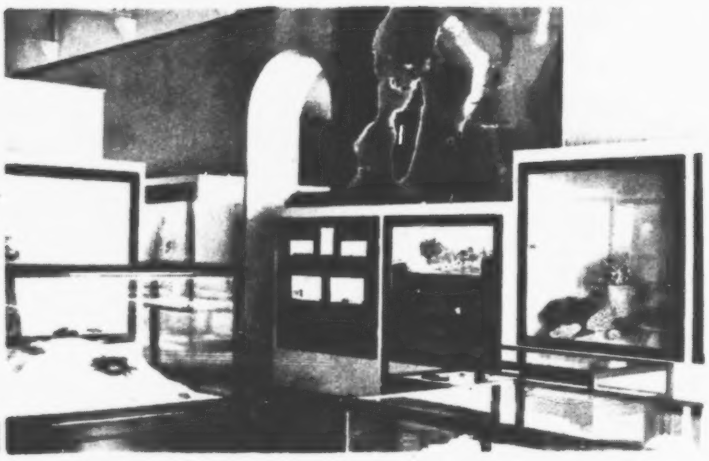
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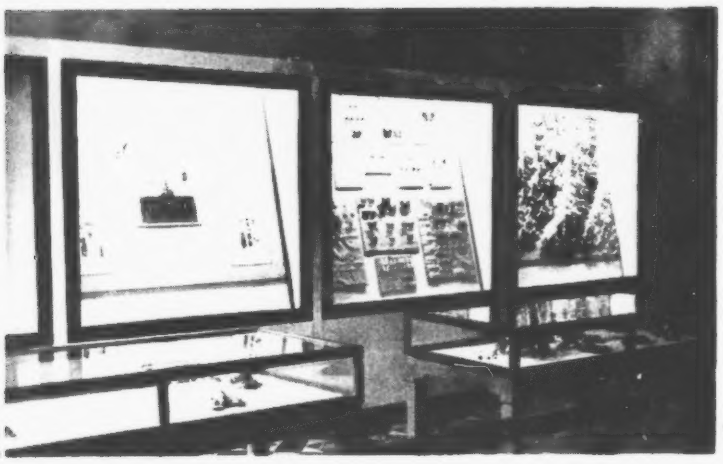
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